

## Prospective Hospital-Based Assessment of the Clinical Profile of both Falciparum, Vivax and Mixed Infections

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### Abstract

**Aim:** The objective was to study clinical profile and outcome of malaria in two species and mixed infection.

**Methods:** The present study was done in department of Medicine, Sadar Hospital, Motihari, Bihar, India. The study was carried out on 120 patients admitted for the period of nine months in this hospital. It was a prospective cohort study.

**Results:** In the present study, out of 120 patients more number of males (80 patients) was affected when compared to females (40 patients). The predominant age group affected was 20-30 years, which constitutes to about 41.66%, followed by 31-40 years (33.34%). Up to 75% of patients affected were in the age group of 20-40, who were young and working outdoors. The mean age of in this study was 38.52 years. Fever is the most common presentation in all 120 patients both falciparum and vivax infected patients. This is followed by chills and rigors were present in 70 patients, 40 of patients with falciparum and 30 of the patients infected with vivax. Nausea and vomiting were another common complaint observed in 60 of total patients, more in falciparum 35 than vivax 25.

**Conclusion:** Malaria is very common disease in our country especially, which is one of the endemic areas. Severe malaria usually caused by the falciparum more than vivax, early diagnosis and treatment decreases the mortality and morbidity.

**Keywords:** Clinical profile, Falciparum, Mixed, Vivax

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### Introduction

Malaria is a major global infectious disease caused by parasitic protozoans of the genus *Plasmodium*. Infections in humans primarily involve five *Plasmodium* species: *Plasmodium falciparum*, *Plasmodium vivax*, *Plasmodium ovale*, *Plasmodium malariae*, and *Plasmodium knowlesi*. [1] In the 20th century, malaria was a dreaded disease.

With the efforts of public health agencies and availability of artemisinin derivatives, morbidity and mortality associated with malaria have decreased and there is revival of hopes that malaria will be eradicated from our country in the coming decades. Despite recent reductions in the overall malaria case incidence, malaria remains an important cause of

morbidity and mortality. Global estimates suggest that the disease accounts for 300–500 million morbidity cases and contributes to approximately 3 million deaths annually. [2]

Malaria due to *P. falciparum* has been associated with severe complications and mortality. If we compare the clinical and epidemiological profile of malaria in recent times from what it was in the past, it has been considerably different. The World Health Organization (WHO) estimated the global incidence of *P. vivax* to be 7.5 million cases in 2017, and it is the most prevalent malaria species in Southeast Asia.[2,3] *P. vivax* is particularly troublesome in urban settings because of increased constructional and developmental activities; there is a rising population of migrant workers in cities of India. Previously labeled as benign, severe manifestations are being reported increasingly in vivax malaria across the globe. [4,5]

In the tertiary-level health-care facilities, which function as referral centers, patients come from peripheral urban or rural centers and they are partially treated. These patients also have comorbidities which can affect the clinical course and final outcome of the patients. World health organisation released latest world malaria report which was released on 19 November 2018 an estimated 219 million cases and 435000 deaths in 2017. Data from 2015-2017 shows that no significant progress in reducing global malaria cases was made in this period.[6] Between year 2000 and 2015, malaria incidence among population at risk decreased by 37% globally; during the same period malaria mortality rates among population at risk decreased by 60%. In 2016, there were estimated 216 million malaria cases, an increase of about 5 million cases over

2015. Deaths reached 445000, similar number 2015.[7]

The malaria Incidence and deaths due to malaria have reduced significantly in recent years during the period 2000 to 2015, cases declined by 44% from 2.03 million to 1.13 million and deaths declined by 69% from 932 to 287 annually. Falciparum percentage remained around 50% from 2000 to 2013 but rose to 65.6% in 2014 and 67.1% in 2015 in India.6 In 2017 total cases reported are 0.84 million and falciparum contributes to 63.39% with total deaths about 109. The present study was carried in Bihar, as the reports were very few regarding clinical profile of both falciparum, vivax and mixed infections and their final outcome.

## Methods

The present study was done in department of Medicine, Sadar Hospital, Motihari, Bihar, India. The study was carried out on 120 patients admitted for the period of nine months in this hospital. It was a prospective cohort study.

A detailed history was taken followed by a detailed clinical examination to assess clinical severity and all the patients in this study were proved to be case of malaria either by Peripheral smear examination (both thick and thin smear) or MPQBC or by Malarial antigen Assay. These investigations were ordered before the antimalarial treatment was started. Patients below the age 18 years, pregnant, Fever of any other cause were excluded from this study.

Once the patient was diagnosed to have malaria they were started on Anti-Malarial drugs according to the new WHO guidelines for treatment of Malaria. Other supportive treatment was given according to the patients conditions.

## Results

**Table 1: Gender and Age distribution**

Gender	N
Male	80
Female	40
Age in years	N
Less than 30	50
31-40	40
41-50	15
51-60	10
Above 60	5

In the present study, out of 120 patients more number of males (80 patients) was affected when compared to females (40 patients). The predominant age group affected was 20-30 years, which constitutes to about 41.66%, followed by

31-40 years (33.34%). Up to 75% of patients affected were in the age group of 20-40, who were young and working outdoors. The mean age of in this study was 38.52 years.

**Table 2: Urban and rural distribution**

Area	Male	Female	Total
Urban	25	15	40
Rural	50	30	80

Majority of these patients were from rural areas i.e. 80 patients (66.66%) and 40 patients (33.34%) from the urban people.

**Table 3: Clinical symptoms**

Symptom	P. Falciparum	P. Vivax	Total
Fever	120	120	120
Chills and rigors	40	30	70
Easy fatigability	20	10	30
Nausea, vomiting	35	25	60
Cough	10	5	15
Altered sensorium	10	0	10

Fever is the most common presentation in all 120 patients both falciparum and vivax infected patients. This is followed by chills and rigors were present in 70 patients, 40 of patients with falciparum and 30 of the patients infected with vivax. Nausea and vomiting were the another common complaint was observed in 60 of total patients, more in falciparum 35 than vivax 25. Other less common symptom were, easy fatigability observed in 30 patients and cough was present in 15 patients. All these manifestations were most commonly observed in falciparum than vivax. Altered sensorium was observed only in falciparum 10 patients. Patients who had

mixed infection presented with almost all symptoms like fever with chills and rigors, easy fatigability, vomiting, cough and altered sensorium.

### Discussion

According to the UNICEF, at every 30seconds, one child expires due to malaria. [8] It is one of the serious problems in our country due to inability to control disease in endemic areas, migration of the populations, and serious complication caused by the disease itself. P. falciparum malaria causes more severe disease, mortality and morbidity so intensive measures have been

implemented mainly against it. *P. vivax* malaria has been neglected and mistakenly considered as “Benign”. [9] But there are few evidences in the past decade from studies in the countries of Asia that *P. vivax* is able to cause severe disease. [10-12]

This may be due to its several important biological differences accounting for these observations, which are the development of the dormant stage in the liver (hypnozoites) causing relapse and greater transmission potential of *P. vivax* at low parasite densities. *P. vivax* is the most common geographically widespread species of Plasmodium causing malaria in human beings.

The incidence of malaria more in men than in women due to the working pattern, i.e. men were exposed to mosquito bites outdoors whereas females are less exposed. In other studies also incidence in male sex was observed to be more like our study but the rate of incidence was different in different studies. In studies like Yadav RK et al, and Surve KM et al, had similar rates of male: female ratio which is 1.32:1 in both. [13,14] In other studies like Khuraiya P et al, and Patel G et al. [15,16]

Icterus observed in 23% of total patients, in other studies like Khuraiya P et al, and Malhotra et al, it was near similar to this study i.e. 27.8% and 25% respectively.[17,18] All these three studies including this study had little higher incidence of falciparum cases compared to vivax cases. Icterus is very low in Surve KM et al, which was observed only in 11%. [19]

Splenomegaly was found in 36% of patients, similar rates observation was made in all other studies except Anshika Jain study, but in Surve KM et al, study which had 32% of splenomegaly patients, Khuraiya P et al, study which had 32.6% of splenomegaly patients and Malhotra et al, group which had 31.25% of splenomegaly. [18,20] But in Anshika Jain

et al, study group it was observed in more than half of patients 69.92% which is greater than double compared to our study.20 Other studies which had very high percentage of splenomegaly are Murthy et al, where patients with splenomegaly are 50%, another study Nand et al, showed 60% of patients with splenomegaly. [22,23] Splenomegaly in Rathod SN et al, study was 93.45% which is very high compared to this study, which higher rate of falciparum and mixed infections with a low incidence of vivax malaria. [21]

Hepatomegaly observed in this study is 14%, seen in the least number of patents compared to other studies. In other studies it was high like Surve KM et al, study showed 20% of patients with hepatomegaly. [19] In Khuraiya P et al it was 26.9%. [15] Anshika Jain et al, study showed 56.71% of hepatomegaly incidence in their study, which had higher falciparum infection group in their study. [20] Another study Rathod SN et al, study had highest rate 65.6% of hepatomegaly in their study. [21] CNS involvement in the form of, Seizures Coma or altered sensorium was observed among 13% of the patients in this study. It was noted that only patients with falciparum infection or mixed infection had these symptoms. It was not observed with any of the patients with vivax malaria. The study by Melhotra et al also found similar observation where the involvement of CNS was observed in 12.5% of the patients. [18]

In the present study is the incidence of falciparum malaria is higher which was 55%, and the incidence of vivax malaria and mixed infections are 42% and 3% respectively. In the study by Alberto Tobin et al, the prevalence of falciparum is 62.6% and whereas vivax was just 35.2% and mixed infection was 2.1%. [24,25]

### Conclusion

Malaria is very common disease in our country especially, which is one of the

endemic areas. Severe malaria usually caused by the falciparum more than vivax, early diagnosis and treatment decreases the mortality and morbidity. We believe that *P. vivax* malaria infection is often underestimated though complications and mortality are almost similar in comparison to *P. falciparum* malaria. Further large scale studies are required to know the exact pathogenesis of complications of *P. vivax* malaria. There is an urgent need of public health measures to estimate the burden of *P. vivax* malaria so that adequate planning and control measures can be taken against this emerging problem.

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