

## Original Research Article

# Study various clinical manifestations and biochemical parameter for liver dysfunction in association with *Plasmodium vivax* malaria

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### ABSTRACT

**Background:** Malaria is a parasitic disease which is majorly caused by the bite of an infected Anopheles mosquito. It has been estimated that the most common type of malaria affecting the human race is known as *Plasmodium vivax*. Human malaria is a global burden with 3.4 billion people at risk over 91 endemic countries. According to the WHO, the involvement of liver dysfunction in *Plasmodium vivax* malaria is not an uncommon phenomenon. Aim of the research was to study various clinical manifestations and biochemical parameter for liver dysfunction in association with *Plasmodium vivax* malaria.

**Methods:** It was an observational study carried out at Teerthanker Mahaveer Medical College and Research Centre, a tertiary care hospital situated in Moradabad for a period of 1 year (March 2017-Feb 2018). Total of 200 patients aged above 15 years, with either sex were part of it. All the patients having mixed malaria with dengue, pregnant women and the patients who did not give written consent for being a part of the study were excluded from the study. A detailed clinical examination was done, including all the hematological and biochemical examinations.

**Results:** The results depicted that the number of male patients was 95, and the number of female patients was 105. The majority of the patients belonged to 15-30 years of age group. The major clinical features of the patients suffering from *P. Vivax* were fever and jaundice. The number of patients with serum bilirubin >3 mg/dl was 55.

**Conclusions:** In light of the above results, it was evident that *Plasmodium vivax* has the capability of producing jaundice, hepatic dysfunction and anemia. The doctors must be very vigilant while treating the patients with *Plasmodium vivax* for any symptoms of jaundice as they are often misunderstood as hepatitis.

**Keywords:** Liver dysfunction, Malaria, *Plasmodium vivax*, Serum bilirubin

### INTRODUCTION

Malaria is a parasitic disease which is majorly caused by the bite of an infected Anopheles mosquito. It has been estimated that the most common type of malaria affecting the human race is known as *Plasmodium vivax*.<sup>1</sup>

It is one of the most devastating diseases and affects hematological levels. Anemia and thrombocytopenia are the most common type of complications faced by the patients infected by *Plasmodium vivax*.<sup>2</sup>

Human malaria is a global burden on mankind since time immemorial with 3.4 billion people at risk over 91 endemic countries and territories.<sup>3</sup> Vivax malaria is responsible for causing significant mortality and morbidity among the affected patients.<sup>4</sup> It has been estimated that nearly 40% of the total population around the globe are at the risk of being infected by *Plasmodium Vivax*.<sup>5</sup>

The identification and the treatment of *Plasmodium vivax* is a major challenge for the doctors as this parasite has

the capacity to form hypnozoites of various stages of *Plasmodium falciparum* and lies dormant for months and even years in some cases.<sup>6</sup> The difference in the presence of *Plasmodium vivax* differs geographically. This difference is due to the proportion of sporozoites that are committed to dormancy, the duration of dormancy and the propensity of dormant stages to re-awaken.<sup>7</sup> According to the WHO, the involvement of liver dysfunction in *P. vivax* malaria is not an uncommon phenomenon.<sup>8</sup> The presence of jaundice with the bilirubin  $\geq 3$  mg/dl is one of the most common complications in *P. vivax*. Anemia, thrombocytopenia, and disseminated intravascular are the hematological alterations that are associated with malaria infection.<sup>9</sup>

**METHODS**

It was an observational study carried out at Teerthanker Mahaveer Medical College and Research Centre, a tertiary care hospital situated in Moradabad for a period of 1 year (March 2017-Feb 2018). Total of 200 patients who were older than 15 years of age and of either sex who were willing to give consent, and had thin and thick peripheral smear positive for *P. vivax* were included in the study. All the patients having mixed malaria with dengue, pregnant women and the patients who did not give written consent for being a part of the study were excluded from the study. A detailed clinical examination of all the included patients was done, including all the hematological and biochemical examinations. Chest radiograph and ultrasonography were done for all the patients. Blood glucose, coagulation profile for disseminated intravascular coagulation (DIC), blood cultures and arterial blood gas analysis were carried out whenever required.

**RESULTS**

As per the above table, out of 200 participants, the number of male patients was 95, and the number of female patients was 105.

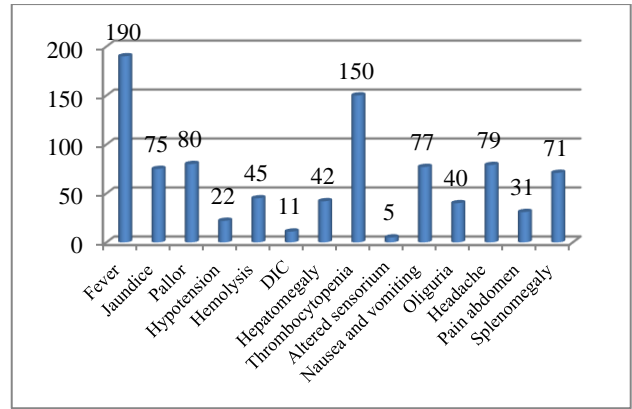
**Table 1: Gender.**

Gender	Number of Patients
Male	95
Female	105

**Table 2: Age Group.**

Age	Male	Female
15-30	50	70
31-45	28	18
46-60	10	12
>60	7	5

The above table depicts that the majority of the patients belonged to 15-30 years of age group. This shows that the majority of the patients were youngsters.



**Figure 1: Clinical features.**

The above graph depicts the major clinical features of the patients suffering from *P. vivax*. As per the graph, fever was found in most of the patients followed by thrombocytopenia, pallor, headache, nausea and vomiting, and jaundice.

**Table 3: Serum bilirubin level.**

Serum Bilirubin	Number of patients
<3mg/dl	145
>3 mg/dl	55

The above table shows the number of patients with serum bilirubin  $>3$  mg/dl and  $<3$ mg/dl. As per the results, the majority of the patients (n=145) had serum bilirubin  $<3$  mg/dl.

**Table 4: Jaundice.**

Jaundice	Number of patients
Present	70
Absent	130

The above table depicts the patients who have jaundice. As per the table, jaundice was absent in the majority of the patients (n=130). This shows that patients suffering with *P. vivax* may show sign and symptoms of jaundice. Thus, it can be said that jaundice is the common complications of malaria.

Of the entire study population, 55.0% self-reported to have experienced previous lifetime malaria episodes with a median of 3 previous episodes. A majority of patients (64.5%) reported having suffered malaria within the last 3 months prior to current episode, and 7.1% of these during the last month, while 1.9% reported  $\geq 10$  lifetime episodes.

A total of 55% patients who reported previous malaria episodes, declared to have received anti-malarial chemotherapy for the last malaria episode, and most (~78%) reported taking the complete treatment regimen. Overall, patients presented at health facilities promptly

for malaria diagnosis regardless of parasite species, although a few patients reported >10 days of illness. A low proportion of patients self-reported concomitant clinical entities such as chronic cardiovascular diseases, gastrointestinal disorders, chronic respiratory diseases, diabetes and others.

Most patients (95%) presented with low-to-moderate parasitaemia ( $\leq 20,000$  parasites/ $\mu\text{L}$ ), with the median parasitaemia significantly higher for *P. vivax* (3,320 parasites/ $\mu\text{L}$ ; IQR 1,475-6,515) than for *P. falciparum* (1,475 parasites/ $\mu\text{L}$ ; IQR 605-3,776).

A total of 91.9% were classified as uncomplicated malaria, and >85% reported with the classical malaria triad of fever, chills and sweating, together with headache. Overall, symptoms presented with a similar distribution for both parasite species. Fever (axillary temperature  $>38^\circ\text{C}$ ) was significantly more frequent in *P. falciparum* cases, whereas pallor was more frequent in *P. vivax* infected patients. Hyperpyrexia (7.9%) and hypothermia (1.6%) were also observed. 8 patients presented with hepatosplenomegaly (ranged 1–3 cm below the costal margin) all with *P. vivax* infections; 2 had a mixed infection. None presented with hepatic dysfunction, although mild alterations in total bilirubin and hepatic enzymes were observed.

## DISCUSSION

As per the literature, it was evident that an increased number of cases of severe *Plasmodium vivax* (*P. vivax*) malaria were registered. In the current study, it has been identified that the number of males was almost equal, but with a little higher on the female side. Similar results were found in the study of Nigam AK et al.<sup>10</sup> In the current study, the cases of jaundice have been present in 70 of the patients. According to the study of Kochar DK et al, (2009), jaundice has been found to be the most common complication of *P. vivax*.<sup>11</sup> Furthermore, in the current study serum, bilirubin was  $>3$  mg/dl in 55 patients. However, in the study of Mahapatra MK et al. (2002), 7.2% of the patients were reported.<sup>12</sup> Birader SM et al, (2016) clarified through the study that, malaria has the capacity to increase the morbidity and mortality.<sup>13</sup> Furthermore, the study revealed that jaundice one of the common complications of malaria.

The authors also depicted that early diagnosis helps in reducing further complications. In the current study, it was identified that the majority of the patients were aged between 15-30 years of age. Similarly, as per the study of Khuraiya et al (2016), the majority of the patients belonged to 12-30 years of age.<sup>14</sup> Furthermore, in the current study, the majority of the patients had a fever, followed by pallor as their clinical feature. However, as per the study of Khuraiya P et al, (2016), pallor was the most commonly found clinical feature among the patients.<sup>14</sup> The results of the study by Birader et al, (2016) were at par with the current study.<sup>13</sup>

## CONCLUSION

In light of the above results, it was evident that *P. vivax* has the capability of producing jaundice, hepatic dysfunction and anemia. The doctors must be very vigilant while treating the patients with *P. vivax* for any symptoms of jaundice as they are often misunderstood as hepatitis.

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