



To Study Clinical Profile and Complications of Plasmodium Vivax Malaria

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Introduction

Malaria is caused by Plasmodium parasites. It is a protozoan disease transmitted by the bite of infected Anopheles mosquitoes called "malaria vectors." Out of the five parasite species that cause malaria in humans, 2 of these species – *P. falciparum* and *P. vivax*– pose the greatest threat.^{1,2}

Plasmodium vivax is geographically most widely distributed with upto 2.5 billion people at risk and an estimated 70-80 million cases every year⁽³⁾.

Although *Plasmodium vivax* malaria has a huge burden on the health, longevity and general prosperity of the people, research on *Vivax* malaria and its complications are grossly overlooked and left in the shadow of the enormous problem caused by *Plasmodium falciparum*⁽³⁾.

P. vivax can cause both sequestration related and non-sequestration related complications of severe malaria as defined by WHO, including cerebral malaria, renal failure, circulatory collapse, severe anemia, haemoglobinuria, abnormal bleeding, acute respiratory distress syndrome (ARDS), jaundice, and acidosis.⁽³⁾

Many studies have shown that complications associated with *Plasmodium vivax* are on the rise and outcomes are similar to that of *Plasmodium falciparum* malaria⁽⁴⁾. Therefore we had conducted this study in order to evaluate the complications of *Plasmodium vivax* malaria would help gather information on the morbidity caused by the disease and help reduce the burden and unexpected mortality due to the disease.

Material and Methods

This retrospective observational study was conducted at MGM medical college and hospital, Navi Mumbai. Total 75 patients fulfilling the inclusion criteria were enrolled in the study. Clearance was obtained from the Institutional Ethical Committee for the study. The study was conducted between October 2014 to October 2016 for a period of two years. Total 75 patients above 14 years with documentation of *P. vivax* infection were included in study. All patients less than 14 years, mixed malaria, co-infections like dengue, Typhoid Leptospirosis, were excluded from study. Patients admitted in our hospital with diagnosed *vivax* malaria on peripheral blood smear not on

rapid antigen test were enrolled. A detailed history was obtained using a pre-tested proforma from all patients. Further, a detailed systemic examination followed by relevant investigations as mentioned in the proforma were conducted and results noted.

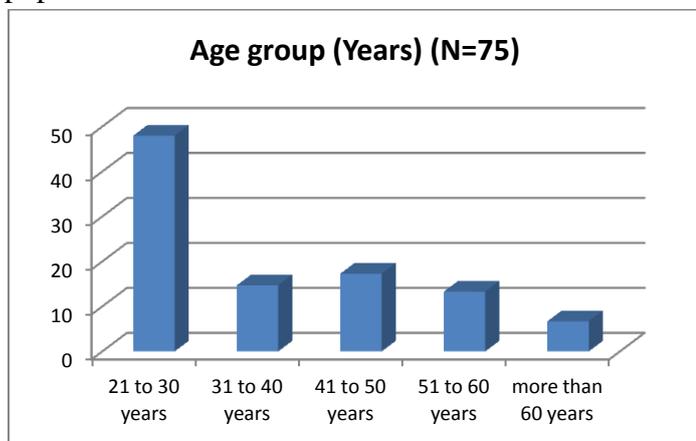
Statistical Analysis

Data were analyzed by statistical product and service solution (SPSS 21) statistical software. Continuous variables presented as mean +/- SD. Categorical variables expressed frequencies. Association in between the parameters was tested using Pearson’s Chi-square test or Fishers exact test. The significance level was set at $P < 0.05$. $P < 0.05$ was considered as significant.

Results

In the present study, the most common age group amongst study population was 21 to 30 years (48%) followed by 41 to 50 years (17.3%) and 31 to 40 years (14.7%) (Figure 1).

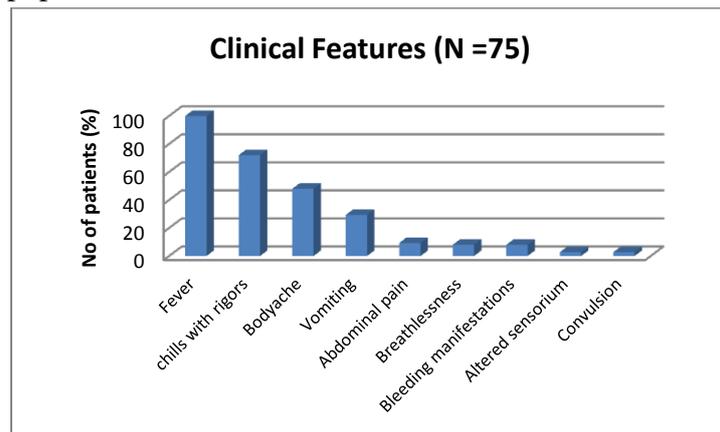
Figure no 1 Age distribution amongst study population



In the present study, there was male predominance (66.7%) amongst study population

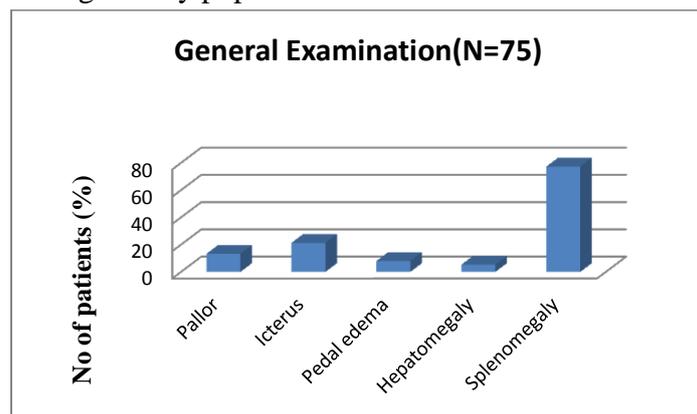
The commonest presenting symptom in *P. vivax* malaria was Fever (100%), chills with rigors (72%), Bodyache (48%), Vomiting (29.3%), Abdominal pain (9.3%), Convulsion (2.6%), Altered sensorium (2.6%) amongst study population.(Figure no 2)

Figure no 2 Clinical features amongst study population



In the present study, Pallor, Icterus, Pedal edema, Hepatomegaly, and Splenomegaly amongst study population was present in 13.33%, 21.33%, 8%, 5.3% and 77.33%, respectively.(Figure no 3)

Figure no 3 General examination findings amongst study population



In the present study, most of the study population had bilirubin level of 1-2 mg% (48%) followed by less than 1 mg% (21.33%) and 2-5 mg% (17.33%) Increased SGOT/ SGPT level (3-5 times) was present in 34.67% of study population followed by 2-3 times (24%) and > 5times (13.33%)

In the present study, most of the patients in the study population had WBC count of 4000 – 11000 (88%) followed by < 4000 (8%) and > 11000 (4%).

Most of the patients in the study population had platelet count of 50000 - 1 Lac /cmm (37.3%) followed by 20000-50000 /cmm (30.7%) and > 1.5 Lac /cmm (12%), hemoglobin level below 11 gm/dl was present in 19% of study population

In the present study, most of the study population had PT/INR < 2 (74.7%) and > 2 (25.3%), BUN was raised (> 20 mmol/L) in 13.3 % of study population

In the present study, Creatinine was < 1.2 mg/dl , 1.3-3 mg/dl and > 3 mg/dl in 60%, 26.67% and 13.33% respectively in study population.

In the present study, CNS manifestations was present in 10.67 % of study population

Splenomegaly on ultrasound of abdomen was present in 77.3 % of study population

In the present study, out of 75 patients 96% were recovered and 4% died.

Discussion

Malaria imposes a great burden on humanity with infants, young children, adults and pregnant women being identified as high-risk groups with a propensity to develop severe malaria.

P. vivax was considered to result in 'benign tertian malaria'. Recently, *P. vivax* is being increasingly recognized as one of the etiological factors for severe malaria in children and adults. ⁽⁵⁻⁷⁾. In endemic regions, this relapsing disease is responsible for substantial morbidity, mostly associated with recurrent bouts of fever, anaemia and adverse pregnancy outcomes ^(8,9). *Plasmodium vivax* is not generally regarded as sufficiently virulent to cause death. Notwithstanding this benign reputation, over the last two to three decades, there have been multiple case studies of fatal vivax malaria ^(10,11) More recently, hospital and outpatient surveillance systems have shown that *P. vivax*-associated mortality may be occurring with greater frequency than previously thought or reported ^(12,13)

In the present study, the most common age group amongst study population was 21 to 30 years (48%) followed by 41 to 50 years (17.3%) and 31 to 40 years (14.7%). This is in accordance to study conducted by Dilip R Patil et al., ⁽¹⁴⁾ in which also higher incidence of vivax malaria was seen in the age group of 21 to 30 (23.53%). 23.15%, Similar findings was observed in the study conducted by Nadkar et al., ⁽¹⁵⁾, O'brien et al., ⁽¹⁶⁾ and Bansal et

al. ⁽¹⁷⁾ in which 21 to 30 years was observed in 23.15%, 37.5%, and 25.9% respectively . The factors responsible for age pattern include outdoor work for young adult males and outdoor sleeping habits which are more prone to get mosquito bites. In the present study, male (66.7%) predominance was observed in study subjects with prevalence of male to female as approx. 2 :1. Similarly in the study conducted by Dilip R Patil et al., ⁽¹⁴⁾ in which males (62.37%) outnumbered females (37.3%). Similar findings was observed in the study conducted by Nadkar et al. in which males - 71.9% and females - 28.1%., ⁽¹⁵⁾.

In the present study, fever, chills with rigors , Bodyache, Vomiting, Abdominal pain, Convulsion, Altered sensorium amongst study population was present in 100%, 72%, 48%, 29.3%, 9.3 % , 9.3% , 9.3 % , respectively. Similarly in the study conducted by Dilip R Patil et al. ⁽¹⁴⁾ incidence of fever with chills and rigors is 98%. Similar findings was observed in a study done by Apte et al. ⁽¹⁸⁾ and Echeverri et al. ⁽¹⁹⁾ , O'brien et al. ⁽¹⁶⁾.

In the present study, examination findings showed, pallor, Icterus, Pedal edema, Hepatomegaly, and Splenomegaly amongst study population was present in 13.33%, 21.33%, 8%, 5.3% and 77.33 % , respectively. Similarly in the study conducted by Jyoti Kharche et al., ⁽²⁰⁾ Splenomegaly was present in 40% of the patients and hepatomegaly was present in 5.5% of the patients . Similar findings was observed in the study conducted by Don Oh Myoung, in which Splenomegaly , hepatomegaly was present in 42 % and 12.2% respectively. ⁽²¹⁾

The sequestration of erythrocytes, containing metabolically active parasite in the vascular bed of internal organs can elucidate almost all the pathological events in severe and complicated *P vivax* malaria. Malarial parasites also induces the release of cytokines like TNF-alpha, IL-1 and IL-6 that initiate many of the pathological process causing manifestations of malaria.

Jaundice in malaria results from hemolysis of both parasitized and non-parasitized red cells as well as malarial hepatitis. Raised liver enzymes

occurs because of injury to hepatocyte and cholestasis. In the present study, most of the study population had bilirubin level of 1-2 (48%) followed by Less than 1 (21.33%) and 2-5 (17.33%).

Thrombocytopenia is considered to be caused by increased splenic sequestration, immune mediated destruction and shortened platelet survival. In our study, Thrombocytopenia was present in 88.7% of study population. This is in accordance to study conducted by Dilip R Patil et al.⁽¹⁴⁾ they found thrombocytopenia as commonest finding in 89.2% either mild or severe which is comparable to 89.7% in a study conducted by Bansal et al.,⁽¹⁷⁾ and 89.3% in a study conducted by Nadkar et al. Bleeding tendency is seen in 5.9% in severe thrombocytopenia which also had deranged PT >16.⁽¹⁵⁾

Cerebral malaria in patients with *P. vivax* has been postulated to sequestration of infected erythrocytes in vascular beds of the cerebrovascular system. In the present study, CNS manifestations was present in 10.67 % of study population. Similarly in the study conducted by S. P. Singh et al., Cerebral malaria was noted in 17 (18.9%) of vivax.⁽²²⁾

In our study, 3 patients who died had four organ dysfunction hematological, renal, CNS and hepatic dysfunction and other had respiratory. This is comparable with previous studies. Kochar et al.⁽³⁾ in their study of 40 severe vivax infections, only 2 had 4 organ involvement. That were with cerebral malaria, renal failure, severe anemia, thrombocytopenia and ARDS, jaundice, renal failure. Nadkar et al.,⁽¹⁵⁾ in his study observed 4 organ complications were seen in 1 (0.20%) patient.

Conclusion

The trend of disease with plasmodium vivax malaria is changing. It is increasingly recognized that serious and life threatening complications can occur with vivax malaria. There is an urgent need to re-examine the clinical spectrum and burden of *P. vivax* malaria so that adequate control measures

can be implemented against this emerging but neglected disease.

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