ORIGINAL ARTICLE

A STUDY OF CLINICAL PROFILE OF PATIENTS WITH PLASMODIUM VIVAX MALARIA

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ABSTRACT: BACKGROUND AND AIM OF THE STUDY: Malaria remains one of the major health problems in the tropics with increased morbidity & mortality. Although Plasmodium falciparum has been commonly implicated as the cause of complicated malaria but now the trend is changing and vivax is increasingly presenting with severe complications. Hence this study was undertaken to study the clinical profile of patients admitted with Plasmodium vivax mono-infection. **MATERIALS AND METHODS:** 50 patients presenting with fever in whom the peripheral smear and/or quantitative buffy coat was positive for Plasmodium vivax malaria were enrolled for this study. Their clinical features, complications and outcome were studied, analyzed and reported. **RESULTS:** The most common symptom was found to be fever in all the patients followed by headache, jaundice, and vomiting and pain abdomen. The important signs were splenomegaly, hepatomegaly, pallor and icterus. Complications like hepatic dysfunction, multiorgan failure, cerebral malaria, bleeding manifestations, acute kidney injury and acute respiratory distress syndrome were found in significant number of patients. **CONCLUSION:** Severe complications which were earlier known to occur with falciparum malaria are also observed with Plasmodium vivax infection. Early diagnosis, recognition of complications and prompt initiation of treatment is the corner stone in the management of Plasmodium vivax in reducing the morbidity and mortality.

KEYWORDS: Plasmodium vivax, Hepatic dysfunction, Multiorgan failure.

INTRODUCTION: Malaria is a major public health problem, endemic in over hundred countries across the world.[1] A total of 2.6 billion people are reported to be living at risk of Plasmodium vivax malaria.[2] A total of 130-435 million people are estimated to suffer Plasmodium vivax infection annually.[3] According to the latest estimates, released in December 2013, there were about 207 million cases of malaria in 2012 (with an uncertainty range of 135 million to 287 million) with an estimated 6,27,000 deaths (with an uncertainty range of 4,73,000 to 7,89,000).[4] Malaria is caused by Plasmodium parasites. The parasites spread to people through the bites of infected Anopheles mosquitoes, called "malaria vectors", which bite mainly between dusk and dawn. There are four parasite species that cause malaria in humans: Plasmodium falciparum, Plasmodium vivax, Plasmodium malariae and Plasmodium ovale. Plasmodium falciparum and Plasmodium vivax are the most common. Plasmodium falciparum is the most deadly. It is known that Plasmodium falciparum is known to produce protean manifestations with significant morbidity and mortality. Recently Plasmodium vivax is implicated in producing several complications like hepatitis, thrombocytopenia with bleeding manifestations, cerebral malaria, kidney failure and multiorgan failure resulting in significant morbidity and mortality. Not enough

studies were conducted in this part of South India to find the clinical course, the complications of Plasmodium vivax malaria and its outcome. Hence this study was undertaken.

MATERIALS AND METHODS: This was a prospective hospital based study conducted over a period of one year from 1st January 2013 to 31st December 2013. 50 patients suffering with fever were enrolled for this study. They were admitted in the medical wards/acute medical care of Sri Venkateswara Ramnarain Ruia Government General Hospital, Tirupati a tertiary care teaching center. All the patients were evaluated clinically relevant hematological, biochemical investigations and ultrasound abdomen were done. The diagnosis of Plasmodium vivax malaria was made by peripheral smear examination and/or quantitative buffy coat method. The results were analyzed and compared with other studies that are available.

Inclusion Criteria:

1. Patients aged ≥15 years.
2. Patients tested positive for Plasmodium vivax by peripheral smear and/or quantitative buffy coat.
3. Patients who gave written informed consent for this study.

Exclusion Criteria:

1. Age less than 15 years.
2. Patients with Plasmodium falciparum infections and mixed infections.

RESULTS: A total of 50 patients of Plasmodium vivax malaria mono infections were included in this study. Plasmodium vivax malaria was more common in males. Majority of the patients belonged to the third decade. All patients presented with fever. The incidence of other symptoms were headache (48%), jaundice (42%), vomiting (38%) and pain abdomen (38%). The incidence of associated clinical findings was splenomegaly (56%), hepatomegaly (52%), pallor (48%) and icterus (42%). Hyperbilirubinemia was seen in 42% and severe thrombocytopenia was seen in 20% of the cases. Multi organ dysfunction was seen in 30% cases. Cerebral malaria was seen in 18% of the study population. Acute kidney injury was present in 8% of the cases. ARDS was seen in 4% of the cases. Statistical significance was found between hepatic dysfunction and hepatomegaly as shown in table No. 6 and 7.

Age (in years)	Male (%)	Female (%)	Number
15-20	7	3	10
21-30	10	7	17
31-40	6	5	11
41-50	7	1	8
51-60	1	-	1
61-70	-	3	3
TOTAL	**31**	**19**	**50**

Table 1: Age Distribution of Cases

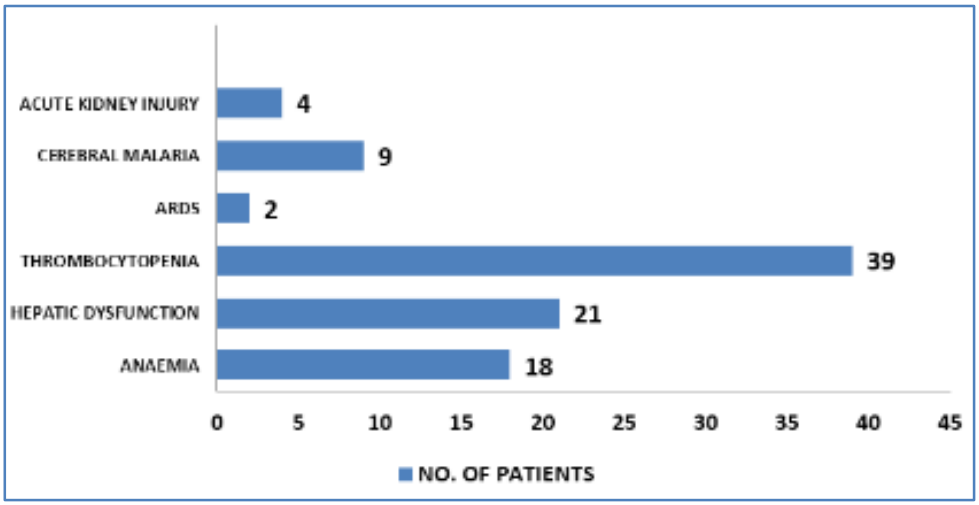
Clinical features	No. of Patients	Percentage
Fever	50	100%
Headache	24	48%
Jaundice	21	42%
Vomiting	19	38%
Pain abdomen	19	38%
Altered sensorium	8	16%
Oliguria	6	12%
Cough	5	10%
Bleeding	5	10%
Rash	5	10%
Breathlessness	4	8%
Convulsions	4	8%

Table 2: Clinical Spectrum of the disease

Sign	No. of patients	Percentage
Splenomegaly	28	56%
Hepatomegaly	26	52%
Pallor	24	48%
Icterus	21	42%
CNS manifestations	9	18%
Respiratory signs	5	10%
Pedal oedema	4	8%

Table 3: Analysis of Clinical Findings

GRAPHIC REPRESENTATION OF MANIFESTATIONS OF SEVERE MALARIA:



Symptoms	Present Study (%)	Song et al[5] (%) Korea	Echevveri et al[6] (%) Colombia
Fever	100	1100	111 9991111
Headache	48	63.6	99
Vomiting	38	334.1	39
Pain abdomen	38	29.5	34

Table 4: Comparison of Clinical Symptoms with other Studies

Manifestations of severe malaria	Present Study (%)	Kochar et al[7] (%)	Kushal Naha et al[8] (%)
Hyperbilirubinemia (>3 mg/dl)	42	57.5	13.62
MODS	30	47.5	-
Thrombocytopenia (<50,000/µl)	20	22.5	31.92
Cerebral malaria	18	12.5	1.41
Bleeding/DIC	10	5	0
Anaemia (Hb<5 g/dl)	8	32.5	0.47
Acute kidney injury	8	45	0.94
ARDS	4	10	1.88
Hypoglycemia	2	2.5	0

Table 5: Comparison of Manifestations of Severe Malaria with Other Studies

Hyperbilirubinemia S.Bilirubin >3mg/dl	Hepatomegaly		Total
	Yes	No	
Yes	15(71.4%)	6(28.6%)	21(100%)
No	11(37.9%)	18(62.1%)	29(100%)
Total	**26(52%)**	**24(48%)**	**50(100%)**

Table 6: Hyperbilirubinemia and hepatomegaly

P Value= 0.01928.

71.4% of patients with serum bilirubin of >3mg/dl had hepatomegaly. Hepatomegaly was seen in 37.9% of patients with serum bilirubin <3mg/dl. This difference in relative frequencies was statistically highly significant.

LIVER ENZYMES SGOT >38 IU/L SGPT >41 IU/L	Hepatomegaly		Total
	Yes	No	
Yes	15(78.9%)	4(21.1%)	19(100%)
No	11(35.5%)	20(64.5%)	31(100%)
Total	**26(52%)**	**24(48%)**	**50(100%)**

Table 7: Raised Liver enzymes and hepatomegaly

P Value = 0.00282.

78.9% of patients with raised Liver enzymes had hepatomegaly whereas hepatomegaly was found only in 35.5% of patients without raised Liver enzymes. This difference in relative frequencies was statistically significant. Thus raised serum bilirubin and raised Liver enzymes were the probable factors determining development of hepatomegaly.

DISCUSSION: The most common symptom in our study was fever 100%, followed by headache 65%. A comparative table of various common symptoms observed in different studies was given in Table No. 4. All studies have a common feature of fever. The mean age of patients was 32.3±13.55years. In the present study male to female ratio was 1.631: 1. It correlates with the study done at Bikaner by Kochar et al[7] where male to female ratio was 1.5: 1. Hepatomegaly was present in 52% cases in our study which correlates with the results obtained from the study conducted by Kochar et al[7] in Bikaner, where hepatomegaly observed was in 57.5% cases. Splenomegaly was seen in 56% of cases in present study, while it was 52.3% in the study done at Korea by Song et al.[5] Bleeding manifestations were seen in 10% cases in the present study. It correlates with mucosal bleed and petechial rash observed in 8.87% cases of vivax malaria, in the study done at Mumbai by Charulata et al.[9] ARDS was seen in 4% cases during the course of the illness in the present study. The incidence of ARDS in a study done at North Karnataka by Kashinkunti et al[10] was 4% and it was 3 % in the study done at Mumbai by Charulata et al.[9] Renal failure was seen in 8% cases in our study and was found in 3.5% cases in the study conducted by Charulata et al[9] in Mumbai. Neurological manifestations were observed in 18% of our study population, it correlates with 16% of cases seen in the study done by Kashinkunti et al.[10] In the present study mean hemoglobin level was 11.16±2.56 g/dl which was comparable with the study done at Manipal by Kushal Naha et al[8] with 12.92±2.24g/dl. Thrombocytopenia was seen in 78% in the present study which correlates with the study conducted by Song et al[5] in Korea, where thrombocytopenia was seen in 75% of cases and in the study conducted by Charulata et al[9] in Mumbai thrombocytopenia was seen in 68% of cases. In the present study, 62% of cases had severe malaria which was comparable to the study done at Manipal by Kushal naha et al[8] where 50.2% cases were with severe malaria. The table no.5 summarises the manifestations of severe malaria (as per the WHO criteria) seen in the present study compared with the study done by Kochar et al[7] and Kushal Naha et al.[8]

CONCLUSION: This study highlights the fact that P. vivax malaria though traditionally considered to be a benign entity can also have a severe and complicated course which is usually associated with P. falciparum malaria. Thrombocytopenia and hepatic dysfunction are commonly seen and are early indicators for the severity of the disease. Life threatening complications such as ARDS, AKI, cerebral malaria and MODS do complicate Plasmodium vivax malaria as seen in our study. However no mortality was found in this study.

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