Original article:

Clinical profile of severe plasmodium vivax malaria in a tertiary centre in J.J.M. Medical College, Davangere

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Abstract

Background: Malaria continues to be a major public health problem in South East Asia. Plasmodium vivax is the most widely distributed human malaria parasite with an at-risk population of 2.5 billion persons. With the implementation of molecular diagnosis, it has become evident that P.vivax monoinfection could also result in multiple organ dysfunction and severe life-threatening disease as seen in P. Falciparum infection.

Materials and Methods: A prospective study was conducted over a period of one and half years on 100 patients with severe malaria infected either with p.vivax or p.falciparum admitted in J.J.M Medical college , Davangere .

Observation and Results: Out of 100 patients with severe malaria of which 65(65%) patients had severe vivax and 35(35%) patients had severe falciparum malaria. Amongst vivax group, 43 (66.15%) were males and 22(33.84%) females. Thrombocytopenia (89.23%) was the most common complication followed by hepatic (29.23), renal (7.69%) cerebral (4.61%) and pulmonary (3.07%) involvement. Most patients were in the age group of 21-30 years .The mortality observed in severe vivax malaria was 1.53% (1/65), as compared to falciparum malaria where it was 5.71% (2/35).

Conclusion: Severe malaria is usually caused by P. Falciparum but it has been observed in our study that P.vivax malaria, which was considered to be a benign malaria, can also result in severe disease. Thrombocytopenia is very common in severe vivax infection. Also, renal, hepatic, lung and cerebral involvement are also affected

Key words : Vivax , Falciparum ,Thrombocytopenia ,cerebral malaria

Introduction

It is believed that most, if not all, of today's populations of human malaria may have had their origin in West Africa (P.falciparum) and West and Central Africa (P.vivax). In the wake of human migration to Mediterranean, Mesopotamia and the Indian peninsula, malaria also spread its wings. References to seasonal and intermittent feversexist in ancient Assyrian, Chinese and Indian religious and medical texts.The major breakthrough in this long and winding history of malaria was the discovery of a therapy for it. In 1600 Juan Lopez, a Jesuit missionary, recorded the use of the fever bark by Peruvian Indians and the Jesuit's bark had come to stay. In 1882Laveran- a French army surgeon at Algiers first saw and described the parasite in man.[1]Malaria is a protozoan disease transmitted by the bite of infected Anopheles

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mosquitoes.[2]Malaria is one of the most serious parasitic disease of the world affecting 300-500 million people and causing over 1million deaths each year.[3]It is one of the most common parasitic infections in our country and over1.65 and 1.77 million cases were reported in 2003 and 2004 respectively. Karnataka has the highest incidence in south India and in 2003 nearly 100 thousand cases were reported in this state, with 22 deaths.[4]Not surprisingly in fatal cases malaria may be complicated with multiple organ dysfunction, the cumulative effects of which cause fatality.[5]Recently there is a changing trend in not only in the clinical manifestations, but also the complications and more and more patients are presenting with ominous systemic manifestations specially to the tertiary care hospitals[6].The knowledge regarding the changing spectrum of malaria SIS very helpful for early diagnosis, because it may become untreatable if the vital time is lost.Awareness of relative prevalence of different complications in a particular geographic area could greatly facilitate the approach towards early diagnosis and prompt treatment.Hence a study on the complications of P.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.

Methodology

Total 100 patients, both male and female with severe malaria who wereadmitted in Bapuji Hospital and Chigateri Government Hospital attached to J.J.M. Medical College were included in this study.

Study design:

A prospective study done for a period one and half from January 2013 to June 2014 year in a tertiary care centre in J.J.M medical college. Detailed history and clinical examination was noted. All severe malaria cases as per WHO criteria were enrolled in the study underwent optimal malarial antigen test to rule out mixed malaria. Routine haematological and biochemical investigations were carried out Patients were followed up till discharge or death.

Inclusion criteria:

- Patient with P.vivax positive malaria.
- Patient with P.falciparum positive malaria.
- Patient age above 16 years

Exclusion criteria:

- Patient with both plasmodium vivax and plasmodium falciparum positive are excluded.
- Patients with chronic liver disease and chronic kidney disease.

Investigation :

- Peripheral smear for type of Malarial Parasit
- Rapid diagnostic test for Malarial parasite (RDT)
- Platelet count
- Liver function tests (Total and Direct Bilirubin, SGPT)
- Renal profile (Blood urea, creatinine)
- Chest X ray, USG abdomen, ABG (if necessary)
- Other routine investigations like: complete blood picture, urine routine and microscopy, random blood sugar

Data collected was analyzed by frequency, percentage, mean, standard deviationand chi-square test.

Results

A Total of 100 patient with severe malaria infected either with P. Vivax or P.Falciparum patients admitted in Bapuji Hospital and Chigateri General Hospital attached to J.J.M.Medical Collage, Davangere were included in this study .

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The predominant age group affected were 21 to 30 years followed by 31-40 years. Same age group were affected in both P.Vivax and P.falciparum malaria.

Among the 100 patient infected with severe malaria 68 patients (68%) were males and 32 patients (32%) were female.Male predominance was seen in both P.Vivax and P.Falciparum malaria. Fever is present in all the patients (100%), Vomiting in 29 cases (29%) Bleeding in 16 cases (16%), altered sensorium in 8 patients (8%) and convulsion in 8 (8%) of cases. All symptoms like vomiting, alteredsensorium and convulsion were common in P.Falciparum patients but bleeding was more commonly seen in P.Vivax patients compare to P.Falciparum.

Table 1 : Analysis of the signs of PV and PF

Variables		**Plasmodium Vivax N=65**	**Plasmodium Falciparum N=35**	**Statistical Analysis χ^2 Test**
Pallor	Present	10(15.3%)	15(43%)	18.89, P<0.000
	Absent	55	20	
Icterus	Present	20(31%)	13(37%)	0.42, NS
	Absent	45	22	
Dehydration	Present	11(17%)	19(54.2%)	9.58, P<0.002
	Absent	54	16	
Hepatomegaly	Present	22(34%)	17(48.5%)	2.07, NS
	Absent	43	18	
Splenomegaly	Present	25(38.4%)	18(51%)	1.56, NS
	Absent	40	17	

Among 100 patients pallor was present in 25 patients (25%), Icterus in 33 cases (33%), dehydration in 30 patients (30%), Hepatomegaly in 39 cases (39%) and splenomegaly in 43 cases (43%). All sign indicative of multi organ involvement were commonly seen in P.Falciparumcompare to P.Vivax.

Table 2 : Haemoglobin levels of PVand PF

Hemoglobin (In grms)	Malaria		Statistical Analysis χ^2 Test
	PV N=65	PF N=35	
≤ 7	1 (1.5%)	3(8.5%)	8.43, P<0.000
7.1 to 11.9	34(52.3%)	25(71.4%)	
≥ 12	30(46.2%)	7(20%)	

[In this study population only 4 (4%) patients had an Hb < 7gm/dl, in them 1 (1.5%) patient was P.Vivax and 3 patients (8.6%) were P.Falciparum positive.]

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Platelet count:

Table 3 : Platelet count of whole group

PLT	Frequency N=100	Percent
<0.5	36	36%
0.5 – 1	49	49%
1.1 - 1.5	6	6%
> 1.51	9	9%

Table1 4 : Platelet count of PV and PF

PLT	Malaria		Statistical Analysis
	PV N=65	PF N=35	
<0.5	28(43.07%)	8(22.85%)	5.15, NS
0.5 – 1.0	30(46.15%)	19(54.28%)	
1.1 - 1.5	3(4.61%)%)	3(8.57%)	
> 1.51	4(6.15%)	5(14.28%)	

Table 5 : Leucocyte count

TLC	Malaria		Statistical Analysis χ^2 Test
	PV N=65	PF N=35	
≤ 4000	7(10.76%)	3(8.57%)	χ^2 = 5.15, NS
4001 – 10000	40(61.53%)	17(48.57%)	
10001 – 15000	18(27.69%)	13(37.14%)	
≥ 15001	0	2(5.71%)	

Lecopaenia was seen in 10 patients (10%) in them 7 (10.76%) patients were P.Vivax positive and 3 (8.57%) patients were P.falciparum positive.

Total bilirubium > 3mg/dl were seen in 31 patients (31%) in them 19 patients (29%) were P.Vivax and 12 patients (34%) were P.Falciparum positive.

Creatinine> 3 mg% present in 12 patients (12%) in them 5 (7.6%) were P.Vivax and 7 (20%) were P.Falciparum.

Thrombocytopaenia more common in P.Vivax (89.23%) than P.Falciparum (77.14%) . Other organ involvement like Hepatic, Renal, ARDS and Cerebral malaria is more common in P.Falciparum compare to P.Vivax. Metabolic acidosis was seen in all patients with ARDS.

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Table 6 : Mean and Standard deviation of laboratory Parameters

Parameters	Plasmodium Vivax N=65		Plasmodium Falciparum N=35		Statistical Analysis unpaired t test
	Mean	Std Deviation	Mean	Std Deviation	
Hb gm%	11.68	1.61	9.69	2.33	5.02, P<0.000
TLC	8541.08	2713.34	10091.14	3170.97	2.57, P<0.01
PLT	0.63	0.44	0.87	0.57	2.25, P<0.02
RBS	113.03	28.67	107.51	20.31	1.09, NS
Urea	56.62	42.20	81.71	53.58	2.58, P<0.01
Creatinine	1.17	0.92	1.79	1.36	2.72, P<0.008
Sodium	135.45	4.98	134.66	4.60	0.77, NS
Potassium	3.80	0.44	3.77	0.56	0.29, NS
TB (mg%)	2.11	1.73	3.08	2.37	2.33, P<0.02
IB (mg%)	1.38	1.26	2.00	1.63	2.14, P<0.03
SGOT	67.51	62.20	117.49	130.10	2.60, P<0.01
SGPT	74.54	70.35	126.89	129.82	2.62, P<0.01

Comparison of mean & Standard deviation of laboratory parameters of P.Vivax and P.Falicp-arum malaria.

Among 100 patients, 97 (97%)improved and 3(3%) expired in our study. Out of 3 patients, 1 patient (1.53%) was P.Vivax positive and 2 patients were P.Falciparum malaria positive.

Discussion

This study was done on 100 patients with severe malaria from January 2013 to June2014 to assess the severity of P.Vivax malaria compare to P.Falciparum malaria in patients who were admitted in Bapuji Hospital and Chigateri General Hospital attached to J.J.M. Medical Collage, Davangere

In our study, all the patients had fever in both the groups this findings correlates with the results obtained from study conducted by Song HH et al[10]. A study by G. Lalitha Murthy et al[10] Showed fever in 98.10% of patients which was comparable. Vomiting was observed in 18.4% and 48.5% of patients in P.Vivax and P.Falciparum malaria respectively in our study. It was 34% in a study conducted by Song HH et al[10].on P.Vivax and it was 57% in a study by VH.Talib[12]on P.Falciparum cases.Neurological involvement in the form of Altered Sensorium and convulsion were seen 4.6% and 14.2% of patients in P.Vivax and P.Falciparum respectively in our study. It was 8.19% and 14.35% of cases in P.Vivax and P.Falciparum respectively in a study by Milind Y Nadkar et al.[9]Bleeding seen in 18.4% and 11.4% of patients with P.Vivax and P.Falciparum respectively in our study. It was 8.87% in P.Vivax in a study by charulata S.Limaye et al.[13]Bleeding in the form of mucosal bleeding,petechial rashes, epistaxsis and hematuria was seen in our study. Breathlessness was seen in 3.07% and 9.3% of patients with P.Vivax and P.Falciparum respectively in our study. Is was 3% and 8.8% cases P.Vivax and P.Falciparum respectively in a study by Charulata S.Limaye et al.[13] Oliguria was

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seen in 7.6% and 20% of cases with P.Vivax and P.Falciparum respectively in our study. It was 3.55% and 19.42% of P.Vivax and P.Falciparum respectively in a study by Charulata S. Limaye et al[13]. It was 32% and 55% of P.Vivax and P.Falciparum respectively in a study by Milind Y Nadkar et al[9]. It is due to renal failure.

No patient had haemoglobin level less than 5 g/dl in our study. It was 2.96% and 12.62% in P.Vivax and P.Falciparum in a study conducted by Charalata S Limaye et al.[13] Severe anemia more common in P.Falciparum compare to P.Vivax cases because it causes Hemolysis in all ages of RBC. Thrombocytopaenia was seen in 89.23% and 77.14% of cases with P.Vivax and P.Falciparum respectively in our study. It was 89.13% and 79.82% in P.Vivax and P.Falciparum in a study by Milind Y Nadkar et al.[9]

Leucopaenia was seen in 10.76% cases of P.Vivax & 8.57% cases of P.Falciparum in our study. It was 19.53% cases of P.Vivax and 18.45% cases of P.Falciparum in study by Charalata S Limaye et al.[13] Most of the patients had leucocyte count between 4000 to 10,000 in both the groups in our study. Patients with Hepatic dysfunction (Total Bilirubin > 3 mg%) were seen 29.23% and 34.2% P.Vivax and P.Falciparum respectively in our study. It was 19.45% and 36.3% in P.Vivax and P.Falciparum respectively in study by Millind Y Nadkar et al.[9]Mainly unconjugated bilirubin is elevated due Hemolysis. ARF (Creatinine > 3 mg/dl) was seen 7.6% and 20% of cases with P.Vivax and P.Falciparum respectively in our study . It was 3.55% and 19.42% in P.Vivax and P.Falciparum in study by Charulata S Limaye et al.[13]It was 31.96% and 55.15% in P.Vivax and P.Falciparum respectively in a study by Milind Y. Nadkar et al.[9] In our study 3 out of 12 patients of ARF were required dialysis remaining patients were treated conservatively with fluid and diuretic therapy. ARDS was seen in 3.07% and 8.5% of cases with P.Vivax and P.Falciparum respectively in our study. It was 1.63% and 2.24% in P.Vivax and P.Falciparum respectively in a study by Milind Y Nadkar et al.[9]It was 3% and 7.7% in P.Vivax and P.Falciparum respectively in a study by Charulata S Limaye et al.[13] It was seen in 4.6% and 14.2% of cases with P.Vivax and P.Falciparum respectively in our study. It was 8.19% and 14.35% in P. Vivax and P.Falciparum respectively in a study by Milind Y Nadkar et al.[9] It was 3.55% and 13.8% in P.Vivax and P.Falciparum respectively in a study by Charulata S Limaye et al.[13]

Mortality rate was 3% in our study. Among 100 patients with severe malaria 3 (3%) expired. In them 1 patient (1.53%) was infected with P.Vivax and 2 patients (5.7%) were infected with P.Falciparum all three patients died because of Multi organ dysfunction mainly due to ARDS . Mortalityrate was 1.77% and 9.71% of patients with P.Vivax and P.Falciparum respectively in a study by CharulateS Limaye et al.l [13]and it was 9.01% and 16.14% in P.Vivax and P.Falciparum respectively in a study by Milind Y Nadkar et al[9]

Conclusion

- P.Vivax malaria, which is considered as benign malaria, however in our study it was observed that it can cause severe life threatening complications like falciparum malaria.
- Severe Vivax Malaria is now very common with increasing mortality
- Thrombocytopaenia is very common manifestation in severe Vivax malaria
- Life threatening complications such as ARDS, ARF, Cerebral malaria and MODS were seen in patient infected with severe Vivax malaria in our study

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- In all patients with vivax malaria, we should assess the severity and treat accordingly, to prevent the morbidity and mortality.

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