Original Article

Study of Clinical and Hematological Profile of *Plasmodium vivax* Malaria in a Tertiary Care Hospital in Western Maharashtra

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Abstract

Background: Malaria continues to be one of the important public health problems in India. As per the World Health Organization (WHO) report 2015, Southeast Asian region bears the second largest burden of malaria (10%), only being next to African region (88%). The present study is aimed at to study clinical and hematological profile of patient with *Plasmodium vivax* malarial infection.

Materials and Methods: Cases satisfying WHO criteria of malaria included in the study population which included 100 patients admitted in Krishna Institutes of Medical Sciences.

Results: A maximum number of cases (78%) were in between the age group of 18-50 years with the high incidence (38%) between the age group of 18-30 years and 67% male and 33% were female. Fever was the most common clinical manifestation present in 100% cases followed by nausea and vomiting in 42%, headache in 23%, myalgia in 19%, pain abdomen in 13%, joint pain in 12% cases, cough 8%, and dyspnea in 4%.

Conclusion: Thrombocytopenia is a common complication seen in vivax malaria and is no longer a distinguishing feature between vivax and falciparum. The clinicians should be aware of this change and give as much attention to vivax malaria so that they can identify the early signs of complications and severe disease. This will help in reducing the morbidity and mortality in malaria.

Key words: Clinical, Hematology, Malaria *Plasmodium vivax*, Western Maharashtra

INTRODUCTION

Malaria continues to be one of the important public health problems in India. As per the World Health Organization (WHO) report 2015, Southeast Asian (SEA) region bears the second largest burden of malaria (10%), only being next to African region (88%). Malaria caused 214 million infections and 438000 deaths worldwide, most of them occurred in the Africa region (90%) followed by SEA region (7%).[1] Among SEA region, India shares two-third of the burden (66%) followed by Myanmar (18%) and Indonesia (10%).[2] The malaria situation remains a major problem in certain states and geographical pockets. The majority of malaria cases and deaths in India are being reported from Orissa, Rajasthan, Jharkhand, Chhattisgarh, Madhya Pradesh, and the Seven Northeastern states.[3]

Malaria is caused by protozoan parasite of genus plasmodium. Five species of the plasmodium such as *Plasmodium falciparum*, *Plasmodium vivax*, *Plasmodium ovale*, *Plasmodium Malariae,* and *Plasmodium knowlesi* cause malaria in humans. Infection is initiated when sporozoites from the salivary glands of a female anopheles mosquito are inoculated during a blood meal into the human blood stream.[4] The common clinical manifestation is fever with chills and rigors, headache, vomiting, jaundice and common sign being splenomegaly, pallor, and icterus.[5-7] Hematological abnormality which is most commonly seen in malaria is thrombocytopenia followed by anemia.

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MATERIALS AND METHODS

Source of Data

A detailed history and physical examination details were collected from patient records in the hospital medical record department. Laboratory investigations were also obtained from the records.

Method of Collection of Data

Cases satisfying WHO criteria of malaria included in the study population which included 100 patients admitted in Krishna Institutes of Medical Sciences. The patient record was analyzed, name, age, sex, duration of symptoms, test done for confirmation, forms of malaria, treatment received from outside, presenting complaints, clinical signs, laboratory investigations, comorbid conditions, and treatment given, and outcome of the treatment was recorded. Patients' population included from urban, rural, and peripheral areas.

Design of the Study

This was a retrospective cross-sectional descriptive study.

Duration of the Study

The study was carried out on patients presenting with malaria during a 24-month period from January 1, 2015 to December 31, 2016.

Inclusion Criteria

All the cases were tested positive for malaria parasite and admitted at the medicine ward in the age group of 15 year and above were included in this study.

Exclusion Criteria

Patients presenting with fever (malaria smear negative) but treated empirically for malaria were excluded from the study, and patients presenting with clinical features mimicking malaria (malaria parasite test negative) as in leptospirosis, dengue fever and sepsis had been excluded from the study.

RESULTS

Figures 1-3 and Tables 1-7.

DISCUSSION

In the present study, a total of 100 malaria cases were studied, a maximum number of cases (78%) were in between the age group of 18-50 years with the high incidence (38%) between the age group of 18-30 years. Similar study was done by Estacio *et al.* who reported that most of their patients (30%) were in between 19 and 35 years of age and Sudhirbabu *et al.* reported that 30% of cases were in the
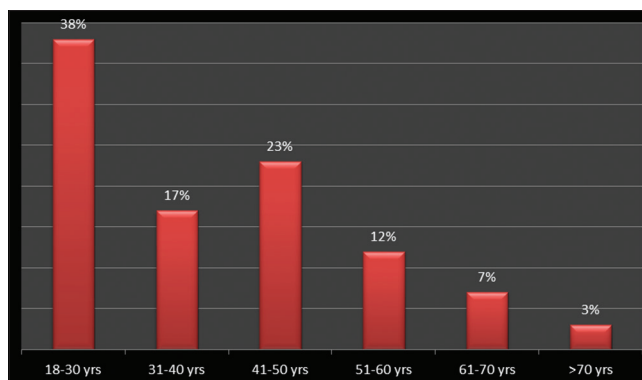

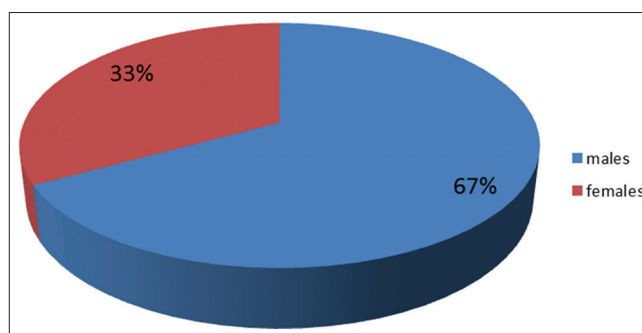**Figure 1: Age-wise distribution of the study participants**

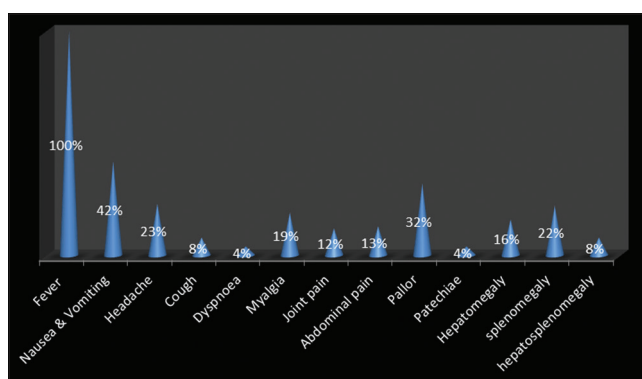**Figure 2: Sex distribution of the study participants**

Figure 3: Clinical profile of the study participants

Table 1: Age-wise distribution of the study participants

Age group	Frequency (%)
18-30	38 (38)
31-40	17 (17)
41-50	23 (23)
51-60	12 (12)
61-70	7 (7)
>70	3 (3)

age group of 21-30 years of age, Maddhu *et al.* reported that 70% of cases were in the age group of 21-30 years of age, and Suryawanshi *et al.* also reported that maximum number of cases (64%) were in between the age group of 20-40 years with the high incidence (34.71%) between

Table 2: Sex-wise distribution of the study participants

Sex	Frequency (%)
Male	67 (67)
Female	33 (33)
Total	100 (100)

Table 3: Clinical profile of the study participants

Symptoms and signs	Frequency (%)
Fever	100 (100)
Nausea and vomiting	42 (42)
Headache	23 (23)
Cough	8 (8)
Dyspnea	4 (4)
Myalgia	19 (19)
Joint pain	12 (12)
Abdominal pain	13 (13)
Pallor	32 (32)
Petechiae	4 (4)
Hepatomegaly	16 (16)
Splenomegaly	22 (22)
Hepatosplenomegaly	8 (8)

Table 4: Hemoglobin levels among study participants

Hemoglobin (g%)	Frequency (%)
<5	7 (7)
5-10	28 (28)
>10	65 (65)
Total	100 (100)

Table 5: Total leukocyte count among study participants

Total leukocyte count	Frequency (%)
<4,000	23 (23)
4,000-11,000	69 (69)
>11,000	8 (8)
Total	100 (100)

Table 6: Platelet count among study participants

Platelet count	Frequency (%)
<50,000	7 (7)
50,000-1,50,000	62 (62)
>1,50,000	31 (31)
Total	100 (100)

Table 7: Parasitic index among study participants

Parasitic index (%)	Frequency (%)
0-5	98 (98)
6-10	2 (2)
>10	00 (00)
Total	100 (100)

the age group of 20-30 years in their study. In the present study and other similar study, there were mostly young- and middle-aged group patients who were affected.[6-9] This may be due to young- and middle-aged group which are being more active outdoors from dawn to dusk.

A total of 100 patients were hospitalized, out of which 67% were male and 33% were female. Male-to-female ratio was 2.03:1. Our study shows male preponderance, this is consistent with similar study conducted by Wasnik *et al*.[10] and also finding concordance to study conducted by Deshwal[11] with male preponderance of 79%, this finding is in consistent to study by Bhakshi[12] where female outnumbered male. This could be because of geographical location and also possibility of incidence of malaria more in men than in women due to working pattern, i.e., man exposed to mosquito's bites outdoor.

In the present study, fever was the most common clinical manifestation which presents in 100% of cases followed by nausea vomiting in 42%, headache in 23%, myalgia in 19%, pain abdomen in 13%, joint pain in 12% of cases, cough 8%, and dyspnea in 4%. The present study's results are nearly similar to study done by Gopinathan *et al*. who reported fever in 97.8%, vomiting in 42.2%, and headache in 69%. Murthy *et al*. who also reported fever with chills and rigor in 98.1%, later Madhu *et al*. noticed that fever was present in all cases (100%), nausea and vomiting in 37.36%, headache in 33.6%, jaundice in 15.78%, and altered level of consciousness in 4.21% cases, and even Devineni *et al*. also noted that fever was the most common symptom (100%) followed by vomiting in 22.22% and headache in 25.56%.[6,7,13,14] Hence, according to above-mentioned studies and the present study, the most common symptoms were fever, headache, and vomiting.

In the present study, 7% of the patients had HB levels <5 g%, 28% had levels between 5 and 10 g%, and 65% had levels >10 g%. Naik conducted a prospective study to look for the incidence of jaundice in *P. vivax* malaria patients in Moodabidriin South India. The mean hemoglobin level was 12.8 g/dl. Nearly 15.8% of the patients were anemic.[15] Ameetkumari *et al*. conducted a cross-sectional study in central hospital laboratory of a tertiary care hospital of Surat, Gujarat. They found that mean hemoglobin level was 10.26 g/dl in *P. vivax* malaria patients.[16] Charulata *et al*. conducted a study of complications of vivax malaria in comparison with falciparum malaria in Mumbai. Severe anemia (Hb <5 g/dl) was found 2.96% of the *P. vivax* malaria patients.[17]

In the present study, total leukocyte count in study participants. Nearly, 23% of the patients had total leukocyte count <4000/cmm (leucopenia), 69% had 4000-11000/cmm, and 8% had counts >11000/cmm (leukocytosis). Myoung *et al*. conducted a study on clinical features of

vivax malaria in South Korea. In their study, 19.9% of the patients had leukopenia, 77.2% had normal levels, and 2.9% of patients had leukocytosis.[18] Shamim *et al.* conducted a study regarding hematological changes in malaria in a tertiary care hospital in Maharashtra. They found that 7.40% of the *P. vivax* patients had leukocytosis while 11.11% of patients had leukopenia.[19] Charulata *et al.* conducted a study of complications of vivax malaria in comparison with falciparum malaria in Mumbai. They found that leukopenia was present in 19.53% of the cases.[17]

In the present study, platelet count among study participants was <50000/cmm in 7% of the patients, 50000-150000/cmm in 62% of the patients, and 150000/cmm in 31% of the patients. Ameetkumari *et al.* conducted a cross-sectional study in central hospital laboratory of a tertiary care hospital of Surat, Gujarat. Mean platelet count was 99487/cmm. They also found that as the severity of increases, the platelet count decreases.[16] Charulata *et al.* conducted a study of complications of vivax malaria in comparison with falciparum malaria in Mumbai. Platelet count of <100000/cmm was present in 68% of the *P. vivax* patients.[17] Shamim *et al.* conducted a study regarding hematological changes in malaria in a tertiary care hospital in Maharashtra. They found that thrombocytopenia was present in 59.25% of the *P. vivax* malaria patients.[19] Beg and Sani conducted study on comparative features and outcomes of malaria at a tertiary care hospital in Karachi, Pakistan. Mean platelet count was 91000/cmm.[9]

In the present study, parasitic index among all the study participants. About 98% of the patients had parasitic index between 0-5% and rest had levels between 6 and 10%. Parasitoids was estimated by counting the number of parasitized red blood cells (RBCs) among 1000 RBCs. Aarathi *et al.* conducted a study on clinical outcome in malaria - reiterating the role of parasitic index. In their study, they found that 81.48% of the *P. vivax* malaria patients had parasitic index between 0 and 5%, 14.81% had index between 6 and 10%, and only 3.70% had index between 11 and 20%.[20]

CONCLUSION

In this study, a maximum number of cases (78%) were in between the age group of 18-50 years with the high incidence (38%) between the age group of 18-30 years with 67% males and 33% were females. Fever is the presenting complaints in almost all the cases and severe

anemia was present in 7% of the patients. Leukopenia and thrombocytopenia were present in 23% and 69 % of the patients, respectively. Maximum patients had parasite index between 0 and 5. Thrombocytopenia is a common complication seen in vivax malaria and is no longer a distinguishing feature between vivax and falciparum. The clinicians should be aware of this change and give as much attention to vivax malaria so that they can identify the early signs of complications and severe disease. This will help in reducing the morbidity and mortality in malaria.

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