



STUDY OF THROMBOCYTOPENIA IN MALARIA AND ITS CORRELATION WITH SEVERITY OF MALARIA: A PROSPECTIVE STUDY

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Abstract:

Background: In poor resource countries malaria is still an important threat to public health. Role of hematological parameters mainly platelet count in acute malaria and its severity is not fully understood.

Aims and Objectives: To study thrombocytopenia in Malaria and its correlation with Severity of Malaria.

Materials and Methods: Hundred confirmed malaria patients were studied at Department of Medicine, Gandhi Medical Collage from March 2015 to September 2016. After a details history taking, all the patients undergone a blood testing for the presence of confirmation on type of malaria infection. Based on the blood reports all the patients were divided in to those having *P. falciparum* infection, *P. vivax* infection and mixed type of infection. Thrombocytopenia was considered if platelet count was <75000 cells/mm³.a

Results: Mean age of the study participants was 38.42 ± 16.21 years with male preponderance (68%). *P. falciparum* (46%) was the most common malaria type. The mean platelet count in *P. vivax* malaria was $114356 \mu\text{l}$ with a range of $7000-467000/\mu\text{l}$, as against *P. falciparum* malaria where the mean platelet count was $100212/\mu\text{l}$ with a range of $1800-356000/\mu\text{l}$ ($p < 0.0001$). The mean platelet count of mixed type of malaria was 98342 with range of $1500-334800$. Prevalence of thrombocytopenia was in 90% in study cohort which was 87% in *P. falciparum* and 92% in *P. vivax* patients 92%.

Conclusion: We found high prevalence of thrombocytopenia. Prevalence was predominant in both *P. falciparum* and *P. vivax* malaria. Platelet count has shown potential utility in identifying severe malaria.

Keywords: platelet count, thrombocytopenia, disease severity, *falciparum malaria*, *vivax malaria*

Introduction

In the tropic countries malaria is one of the common public health problem. As per the previous record from 2015 contribution of malaria cases in South East region from India was 89%. All type of malaria have significant impact on the developing countries like India. ¹Its presence causes significant disability, mortality and economic loss to the country.

Pathogenesis of complication in patients with malaria can easily be understood by the study of changes of red blood cells and platelets. Previous work has demonstrated the usefulness of platelet count evaluating and predicting the severity of malaria. However, several authors have disproven its usefulness. ^{2,3}

Hence the evidences on the importance of platelet count in the assessment of malaria and its severity is balanced and is still a matter of debate among researchers. Although, few studies have also evaluated the potential of platelet count in measuring the disease severity however, the data still seem to be limited. ^{4,5}

Hence in order to increase the evidence on the potential use of platelet count in measuring the disease severity,

present study was designed to study thrombocytopenia in Malaria and its correlation with Severity of Malaria.

Materials and Methods

Present study was performed on 100 confirmed malaria patients who visited the Department of Medicine, Gandhi Medical Collage from March 2015 to September 2016.

Written informed consent and Institutional Ethics Committee approval was obtained before starting the study. After a details history taking, all the patients undergone a blood testing for the presence of confirmation on type of malaria infection.

All Malaria positive cases admitted in medical ward and who were willing to participate were enrolled the study were included in the present study whereas patient referred from hospitals after giving treatment like I/V fluids and other associated co morbid conditions like COPD acute exacerbation, DKA, CRF, etc. were excluded from the present study.

Based on the blood reports all the patients were divided in to those having *P. falciparum* infection, *P. vivax* infection and mixed type of infection.

Platelet count was stratified into normal ($>150,000$ cells/ mm^3). Thrombocytopenia was considered if platelet count was <75000 cells/ mm^3 .

All the data analysis was performed using IBM SPSS ver. 20 software. Quantitative data is expressed as mean and standard deviation whereas categorical data is expressed as percentage. Descriptive analysis was performed for the baseline details. Independent sample t-test analysis was performed to find out the level of significance of each variables. P value of <0.05 was considered as significant.

Results

Mean age of the study participants in present study was 38.42 ± 16.21 years ($n=100$). Male preponderance (68%) was observed as compared to female (32%).

Most cases were of *P. falciparum* (46%) followed by *P. vivax* (39%) and mixed infections were (15%).

The mean platelet count in *P. vivax* malaria was $114356 \mu\text{l}$ with a range of $7000-467000/\mu\text{l}$, as against *P. falciparum* malaria where the mean platelet count was $100212/\mu\text{l}$ with a range of $1800-356000/\mu\text{l}$ ($p < 0.0001$). The mean platelet count of mixed type of malaria was 98342 with range of $1500-334800$ (table 1).

Table 1: Showing baseline parameters of the study participants

Blood parameters		Mean	Min	Max
WBC count	<i>P. vivax</i>	6134	2100	19700
	<i>P. falciparum</i>	6032	1200	17600
	Mixed	5834	1100	16570
Platelet count	<i>P. vivax</i>	114356	7000	467000
	<i>P. falciparum</i>	100212	1800	356000
	Mixed	98342	1500	334800

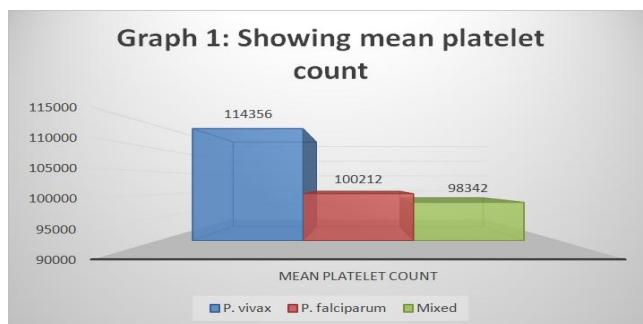


Table 2: Correlation of platelet count with the severity of the malaria using Least significant difference test

Type of malaria	Variable	Mean difference	SE	P value
Platelet count	<i>P. vivax</i>	14144	10.23	<0.001
	<i>P. falciparum</i>	16014	62.34	0.241
	<i>P. vivax</i>	14144	10.23	<0.001
	Mixed	1870	62.34	0.224

In present study thrombocytopenia was reported in 90% of the malaria patients. Among the *P. falciparum* 87% had thrombocytopenia whereas among the *P. vivax* patients 92% has thrombocytopenia. Among the patients with mixed infection, 83% had thrombocytopenia.

Discussion

Falciparum malaria occurs along with variety of manifestations. It is also associated with a variety of complications including high mortality.

Thrombocytopenia is a condition in which blood platelet count (thrombocytes) is decreased. Thrombocytopenia is one of the common features of both *P. falciparum* and *P. vivax* malaria irrespective of the severity of infection. Decreased platelet count in peripheral smear among the patients with fever is the indication for the presence of malaria which is also observed in present study findings.⁶

In present study we found that prevalence of thrombocytopenia is significant in patient with malaria. In our series thrombocytopenia was reported in 90% of the malaria patients. Among the *P. falciparum* 87% had thrombocytopenia whereas thrombocytopenia was higher among those infected with *P. vivax* (92%). In line with present study previous reports by Saravu et al, Patel et al and Jadhav et al reported the similar prevalence of thrombocytopenia.^{4,7,8} A literature review by Lacerda et al has reported a range of prevalence which was 24-94%.⁹ Exact mechanism of thrombocytopenia is not clear however, multiple mechanisms such as immune mediated, platelet phagocytosis, increased oxidative stress, platelet aggregation, etc., are thought to be responsible for the same.

In present study platelet count was significantly lower in severe cases as compared to non-severe cases which is again in line with the previous works done by MohdArif et al and Rogier et al.^{10,11} In present study we did not measure the sensitivity and specificity of platelet count for assessing the severity of the malaria. Previous reports have shown that a platelet count $50,000$ cells/ mm^3 had a sensitivity of 65.6% and a specificity of 70.6% to discriminate severe malaria. (Gupta P 2019) An Indonesian study reported that platelet count of $\leq 20,000$ cells/ mm^3 can be taken as the cut off for severe malaria.¹²

Another study from India only recommended platelet count to be used as the prognostic marker and it can also use to assess the severity of malaria. Another India study from a tertiary care hospital found severe thrombocytopenia to have an independent association with longer hospitalization stay, intensive care requirement and mortality.¹³

Hanson et al reported that platelet count at the time of admission is inversely correlated with malaria severity.

However, Hanson et al concluded that platelet count alone has the limited value as the prognostic marker.²

Present study was cross section study from tertiary care hospital hence present study findings cannot be applied to large population. We did not measure the other platelet indices in present study which are few limitations to taken in to account from the present study.

Conclusion

Prevalence of thrombocytopenia was significant predominant in both *P. falciparum* and *P. vivax* malaria. Compared to both the infections, *P. vivax* malaria is majorly associated with profound thrombocytopenia. In present study we found potential utility of platelet count in identifying severe malaria.

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