



Platelet Count in Cases of Plasmodium Vivax Malaria- A 5 Year Retrospective Study

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Abstract

Background: Malaria is a major health problem in India even today with increased morbidity and mortality. Among the various types of malaria, Plasmodium vivax seems to be the most prevalent one. This study was undertaken to find out the effect of malaria on the platelet count of the patients.

Aims: The aim of this study is to note the changes in platelet count that can be found in the respective cases of plasmodium vivax malaria.

Materials and Methods: The study was conducted over a period of 5 years which included 311 cases of Plasmodium vivax. Their platelet count was measured manually by a haemocytometer.

Results: It has been found that in 311 cases, the level of platelet varies in various samples. The most common manifestation was thrombocytopenia. Out of 311 patients, 271 were found to have a low platelet count. The rest however had platelet count within normal range.

Conclusion: Though malaria is predominantly a disease affecting the red blood cells in a human body, we see that the platelet count is also altered in the disease. The commonest presentation being thrombocytopenia. So, we can conclude that in endemic region, malaria is usually associated with thrombocytopenia.

Keywords: Plasmodium vivax, thrombocytopenia, malaria.

Introduction

Malaria is one of the major health problem in the tropical countries imposing great socio-economic burden on the health system. It is endemic in India. In 2018, 228 million cases of malaria occurred worldwide, out of which sub-Saharan Africa and India carried 85% of the global burden. The estimated deaths due to malaria was 405,000 globally. Nearly, 85% of these deaths occurred in 20 countries of WHO African region and India.¹

P.falciparum is responsible for majority of severe complications.² As a result of this, the majority of the studies has been focused on P. falciparum species. P. vivax malaria has now clearly emerged as a potentially lethal condition^{3, 4}, though it may not cause severe complications like cerebral malaria. The majority of P.vivax burden is in the WHO South- East Region, out of which India carries 47%¹.

P. vivax is mostly associated with haematological complications. The pathogenesis of which may be due to parasite products, T-cell derived cytokines, macrophage activation, macrophage-derived factors such as tumour necrosis factor- α and macrophage dysfunction⁵.

Platelets play a critical role in malarial infections. It has well-established role in innate protection against microbial infections. They bind malarial-infected red blood cell and kills the parasite within.⁶ Children with severe malaria who had a platelet count of less than 100,000/L were 6.3 times more likely to die than those without.⁷ It is general consensus that thrombocytopenia is very common in malaria.⁸ In light of the above facts, a study has been conducted retrospectively to see the commonest presentation of platelet count and its frequency in *P. vivax* mono-infection. The study is a retrospective observational study in a secondary level hospital of eastern India. This may also somewhat guide us to deduce the cause for the complications associated with *P. vivax*.

Materials and Methods

The study was conducted over a period of 5 years from April 2015 to March 2020.

All patients having fever reporting to the hospital both in indoor and outdoor patient were divided into 2 groups- with *P. vivax* malaria and without *P. vivax*. The tests were done initially by rapid diagnostic kits (RDK). Then for confirmation a direct smear was made from peripheral blood both thick and thin. Smears were confirmed for *P. vivax* by conventional microscopy. The number of platelet was calculated by semi-automated cell counter (Sysmex 100 XPS) and then cross-checked manually by a haemocytometer. To avoid any observational error, two observers individually calculated the number of platelets in the smear.

The patients who had associated dengue fever and *P. falciparum* were excluded from this study as they are known causes of thrombocytopenia.

Thrombocytopenia was classified as mild ($100-150 \times 10^3$ cells/ μ L), moderate ($50-100 \times 10^3$ cells/ μ L) and severe ($<50 \times 10^3$ cells/ μ L).⁹

Results

The total number of samples collected were 311. The number of males were 265 out of 311 (85.20%). The male-female ratio is 5.7:1 (Table 1). So, *P. vivax* is more commonly found to infect males.¹⁰

Table 1 Gender wise distribution of cases

S. No	Gender	Number	Percentage
1.	Male	265	85.20
2.	Female	46	14.79
	Total	311	100

The age range of our study was from 6 to 65 years. Most number of cases were found in the age group of 21-30 years. The number is 124 (39.87%). The least number of cases were in the age group <10 years, 7 in number (Table 2). This is in accordance with the study conducted by Kar K, et al¹¹

Table 2 Age-wise distribution of cases

S. No	Age	Number	Percentage
1.	<10	07	2.25
2.	11-20	36	11.5
3.	21-30	124	39.87
4.	31-40	72	23.15
5.	41-50	35	11.25
6.	51-60	25	8.03
7.	>61	12	3.8
	TOTAL	311	100

The number of patients among these who developed thrombocytopenia that is low platelet counts was 271 (87.13%). As mentioned earlier, the patients was divided into 3 categories on the basis of their platelet count.

Mild thrombocytopenia was seen in 207 (66.55%) cases. 43 cases had moderate thrombocytopenia. 21 cases had severe thrombocytopenia and 40 cases had a normal platelet count. The lowest platelet count was $9.8 \times 10^3/\mu$ L and the highest platelet count was $450 \times 10^3/\mu$ L (Table 3). This is in accordance with the study conducted by Coelho C Christina H et al¹²

Table 3 Platelet count in patients of vivax malaria

SL.NO	PLATELET CT	NO. OF PATIENTS	PERCENTAGE	RANGE ($\times 10^3/\mu\text{L}$)
1.	NORMAL	40	12.86	150-450
2	MILD	207	66.55	101-148.7
3.	MODERATE	43	13.82	51-99.8
4.	SEVERE	21	6.75	9.8-49.5
	TOTAL	311	100	

The average hospital stay was from 5-7 days and mild bleeding tendencies were found in 4 patients with severe thrombocytopenia. Their stay was otherwise uneventful.

Discussion

As this study was conducted over a period of 5 years, it may have some credentials in highlighting some facts about Plasmodium vivax malaria in the population of eastern India.

In this study we found that mostly males are affected by vivax malaria. This is in accordance with the study conducted by Muddaih M and Prakash P.S¹³

It was found that the commonly affected age group was young adults from 21-30 years of age. This corroborates with the study of Joshi and Gowardhan¹⁴

Now, detection of malarial parasites in the peripheral smear is the gold standard for diagnosis of malaria. This time-consuming and requires expertise especially if the parasite load is less⁹.

The prevalence of thrombocytopenia in our study was 66.55 % highlights the fact that persistent normal platelet count is unlikely in P. vivax infection. The mechanism of thrombocytopenia in malaria could be due to peripheral destruction and consumption by DIC.^{15, 16}

Profound thrombocytopenia with a platelet count as low as 5000/ μL has been reported in Indian literature in a 43 year old female patient of vivax malaria.¹⁷ Although in our study the count went till 9,800/ μL .

The presence of thrombocytopenia in a patient with acute febrile illness thus increases the probability of 41 cases out of 50 cases of P.vivax had thrombocytopenia.¹⁸ Along with other mechanisms described above, in vivax malaria there is splenic pooling and reduced lifespan of

circulating platelets. It has also been observed that frequencies of plasma circulating micro-particles were also markedly increased in P. vivax patients, as compared to healthy age- matched malaria-unexposed individuals. The platelet derived micro-particles increase in a linear fashion with the presence of fever and length of acute symptoms.¹⁹

Conclusion

Thus in our study we see that most of the vivax malaria cases are associated with thrombocytopenia, but the course of the disease is usually benign. Most of the patients recovered without any complications. Hence, thrombocytopenia in patients with acute febrile illness should be suspected for malaria especially in endemic region.

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Conflict of Interest: None found.

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