



STUDY OF THROMBOCYTOPENIA IN PEDIATRIC PATIENTS WITH *PLASMODIUM VIVAX* MALARIA

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ABSTRACT **Background:** Malaria is a mosquito borne infection caused by protozoan parasite of genus *Plasmodium* which is transmitted through bite of an infected female *Anopheles* mosquito. Almost half of malaria cases in India are caused due to *P. vivax* infection. Most common hematological abnormalities seen in malaria are anemia and thrombocytopenia. **Material and Methods:** A total 73 cases of *P. vivax* infection were included in the study. The diagnosis was made on peripheral blood smear (PBS) and/or by rapid diagnostic test. Complete blood count (CBC) was done on all cases. **Results:** Out of total 73 *Plasmodium vivax* malaria positive cases 43 (58.9%) were males and 30 (41.1%) were females. Thrombocytopenia was detected in 56 (76.7%) out of which 38 (52%) had mild and 18 (24.7%) had moderate thrombocytopenia. In present study no cases of severe thrombocytopenia seen. **Conclusion:** We detected thrombocytopenia in 76.7% pediatric patients which emphasizes the importance of studying platelet count in children suffering from *P. vivax* malaria.

KEYWORDS : Malaria, *Plasmodium vivax*, Thrombocytopenia.

INTRODUCTION:

Malaria is a mosquito borne infection caused by protozoan parasite of genus *Plasmodium*. It is transmitted through bite of an infected female *Anopheles* mosquito. Five species of *Plasmodium* causing malaria in humans are *P. falciparum*, *P. vivax*, *P. ovale*, *P. malariae* and *P. knowlesi*.¹ Of these, *P. falciparum* and *P. vivax* are the most common species causing malaria in India.²

According to WHO report 2019, (in the year 2018) 3.2 billion people are at risk of malaria infection. 228 million malaria cases are reported worldwide and 405,000 people died, mostly were children in the African region. India accounts for 2% of malaria cases globally in 2018. Globally, 53% of the *Plasmodium vivax* burden is in the South-East Asia Region, with the majority being in India (47%).³

Recent studies from South-East Asia had reported *P. vivax* malaria is the major cause of morbidity and mortality in infants and children as previously it was known to cause benign tertian malaria.^{4,5}

Malaria is often observed to be associated with hematological abnormalities and Most common being anemia and thrombocytopenia. Various observational studies have confirmed thrombocytopenia association with malaria.⁶ Thrombocytopenia is common among people living in the tropics and non immune subjects infected by *P. falciparum* or *P. vivax*.⁷ Thrombocytopenia is a common hematological complication seen in *P. vivax* malaria. It is no longer a distinguishing feature between *P. vivax* and *P. falciparum*.⁸

AIM & OBJECTIVES

To identify thrombocytopenia in pediatric patients with *Plasmodium Vivax* malaria.

MATERIAL AND METHODS:

This was an observational cross-sectional study conducted from 1st February 2019 to 31st January 2020. Out of 100 total malaria cases admitted in the hospital, 73 were *P. vivax* malaria patients which were included in the present study. Children upto 14 years admitted in pediatric ward were included in the study. Clinically suspected malaria patients were screened for *P. vivax* malaria by peripheral blood smear (PBS) and/or rapid diagnostic tests (RDTs) method. Venous blood samples were collected in the purple top vacutainer with EDTA as an anticoagulant to perform PBS, RDT and platelet count.

PBS is gold standard for diagnosis of malaria. Thick and thin smear were prepared and stained by Giemsa stain which was then observed under 100X oil immersion field.

RDT is a rapid test to detect malaria in 20 minutes. MALARIGEN Malaria Rapid Card kits (*Pf/Pan Ag*) were used. It is a used for the

detection of antigens of *Plasmodium falciparum* (*Pf*) and Pan malaria (*P. vivax/P. malariae/P. ovale*) in human whole blood.

Platelets were counted in automated hematology analyzers using Coulter's concept of Electronic Impedance. Thrombocytopenia was defined as platelet count less than 1.5 lacs/ μ l. Thrombocytopenia was classified on the basis of platelet count as:^{9,10}

- Mild: 50,000- 1.49 lacs cells/ μ l
- Moderate: 20,000-49,000 cells/ μ l
- Severe: <20,000 cells/ μ l

RESULTS:

This was an observational cross-sectional study. Clinically suspected malaria cases admitted to Pediatrics Department were included. Positive cases were confirmed by PBS and/or malaria RDT. This study includes 73 positive cases of *P. vivax* malaria.

Out of 73 patients *P. vivax* patients 43 (58.9%) were males and 30 (41.1%) were females. All the positive cases were investigated for platelet count to find thrombocytopenia.

Incidence of thrombocytopenia was 56 (76.7%). Table 1 shows age wise distribution of thrombocytopenia in *P. vivax* infection. Out of 56 thrombocytopenia cases, the number of cases in infants were 9 (16.1%), in age group 1-5 years the number of cases were 18 (32.1%), in the age group 6-10 years the number of cases were 17 (30.4%) and in age group above 10 years the number of cases were 12 (21.4%).

Table 1: Age Wise Distribution Of Thrombocytopenia

Age group (years)	Cases	Percentage (%)
< 1	9	16.1
1-5	18	32.1
6-10	17	30.4
>10	12	21.4
Total	56	100

Table 2 shows grading of thrombocytopenia in which out of 56, 38 (67.9%) had mild and 18 (32.1%) had moderate thrombocytopenia. There was no case of severe thrombocytopenia seen in the present study.

Table 2: Grading Of Thrombocytopenia.

Grade of thrombocytopenia	No. of cases	Percentage
Mild (50,000-1.49 lacs/ μ l)	38	67.9
Moderate (20,000- 49,000/ μ l)	18	32.1
Severe (<20,000/ μ l)	0	0
Total	56	76.7

Out of 73 *P. vivax* infection cases, 13 (17.8%) had abnormal bleeding manifestations. Out of 13 cases, 8 (61.5%) cases had epistaxis and 5 (38.5%) cases had blood in stools (malena).

DISCUSSION:

In this observational study we confirmed 73 *P. vivax* malaria cases by either PBS or RDT. In endemic areas malaria has been reported as the cause of low platelet count. If thrombocytopenia is presented along with fever, malaria infection should be suspected.^{6,11}

In the present study males were more positive 43 (58.9%) compared to females 30 (41.1%). This may be due to increased outdoor activities in male and thus more exposure to mosquitoes. Since this is backward area, the kind of clothes females wearing covers maximum part of body.

Out of total 73 *P. vivax* malaria, 56 had thrombocytopenia. In the present study thrombocytopenia was seen in 76.7%. A study done by Gupta et al and Mangla et al had reported significant thrombocytopenia that is 78% and 80% respectively in *P. vivax* malaria similar to the present study.^{6,8} Many studies showed significant correlation between thrombocytopenia and *P. vivax* infection. However few studies reported slightly lower incidence of thrombocytopenia in contrast to the present study. Study done by Maina RN et al and Rodriguez-Morales AJ reported 40% and 58.97% thrombocytopenia in *P. vivax* malaria respectively.^{12,13} There was no case of severe thrombocytopenia seen in present study. In contrast study done by Mangla et al, reported 16.6% cases of severe thrombocytopenia in vivax malaria cases.⁸ Similar finding was seen by Verma et al, where they also found thrombocytopenia more common in *P. vivax* group (73%) but severe thrombocytopenia was seen in *P. falciparum* patients.¹⁴

In the present study bleeding manifestations were seen in 13 (17.8%) cases of *P. vivax* malaria, mostly were associated with clinical bleed in the form of epistaxis or gastrointestinal hemorrhage (malena). Out of 13 cases, 8 (61.5%) cases had epistaxis and 5 (38.5%) cases had blood in stools. Mangla et al also reported bleeding manifestations in 13.6% vivax malaria cases.⁸ Mehmood et al (Karachi) reported 90% incidence of thrombocytopenia with only 5% having bleeding manifestations.¹⁵ There were less episodes of bleeding as compared to thrombocytopenia caused by other etiology. This may be due to the hyperactive platelets which may enhance haemostatic response in acute malarial infections with significant thrombocytopenia.¹⁶ This may be due to increased splenic sequestration and shortened survival of platelets.¹⁷ Fajardo and Tallent demonstrated *P. vivax* within platelets by electron microscopy and suggested direct lytic effect of parasite on the platelets.¹⁸ There are various mechanisms suggested in literature about occurrence of thrombocytopenia involving both immunological as well as non-immunological mechanism¹⁷ where specific platelet associated IgG antibodies binds directly to malaria antigen present in platelets leading to lysis of platelet.¹⁹ Damage of platelets by oxidative stress have also etio-pathogenic role which was based on the finding of low level of platelet superoxide-dismutase and glutathione peroxidase activity and high platelet lipid peri-oxidation levels in malaria patients.²⁰

In young children of tropical countries hematological morbidity associated with *P. vivax* infection is more due to complex interaction of factors like failure of treatment, relapse, gastrointestinal helminth infection and malnutrition.⁸

CONCLUSION:

We detected thrombocytopenia in 76.7% pediatric patients which emphasizes the importance of studying platelet count in children suffering from *P. vivax* malaria. Pediatric population is more prone of development of thrombocytopenia in *P. vivax* infection. Possibility of malaria should be kept in mind in cases of fever with thrombocytopenia.

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