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Thrombocytopenia in children with malaria-A study from coastal Karnataka, India

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ABSTRACT

Objective: To study the occurrence and severity of thrombocytopenia in children with malaria. **Methods:** It was a retrospective study, done at Fr Muller Medical College Hospital Mangalore, in Karnataka, India. Data regarding all positive cases of malaria < 15 years admitted in the hospital between January 2010 to June 2011 were obtained. Patients were further assessed for thrombocytopenia and its severity. Data were analysed by *Chi* square test using SPSS version 13.0. **Results:** A total of 159 cases were included in the study with a mean age of presentation of 9 years. *Plasmodium vivax* was identified in 106 (66%) patients while *Plasmodium falciparum* in 26 (16%) and mixed infection in 27 (18%) patients. Thrombocytopenia was observed in 113 (71%) cases, of which 35 (31%) cases had mild, 49 (43%) cases moderate and 29 (26%) cases had severe thrombocytopenia. Thrombocytopenia was equally found in vivax and falciparum infection with no significant difference in severity between vivax and falciparum species. **Conclusions:** Thrombocytopenia is frequently seen in malaria and it is not dependent on type of malaria. In any acute febrile illness, thrombocytopenia should alert one to the possibility of malaria.

1. Introduction

Malaria is endemic in the tropics and subtropics causing 247 million infections worldwide and 3.3 billion world's population were at risk in 2006 causing nearly a million deaths of which 88% occurred in sub-Saharan African children < 5 years of age. The burden of malaria in Southeast Asia has been underappreciated, despite recent evidence suggesting that the continent contributes almost 40% of the world's malaria. India contributes 75%-77% of the total malaria in Southeast Asia and about 95% of the population of moderate to high risk of malaria in Southeast Asia Region is living in India[1,2].

It is caused by protozoa parasite of the genus *Plasmodium* which infects and destroys red blood cells. Four species of plasmodia [*Plasmodium falciparum* (*P. falciparum*), *Plasmodium malariae*, *Plasmodium ovale* and *Plasmodium vivax* (*P. vivax*)] cause malaria in humans of which *P. falciparum* is the most common cause of morbidity and mortality. Malaria parasite affects multiple organs of the body like liver, spleen, brain, gastro intestinal tract, gall bladder, pancreas, blood vessels and placenta. So, the clinical picture could be of wide spectrum ranging from simple malaise to life threatening central nervous system symptoms like coma.

Thrombocytopenia has been reported to be associated with malaria, with an incidence ranging from 60%-80%, with some studies reporting a lower incidence in vivax malaria as compared to falciparum malaria[3]. In view of paucity of data in children from Indian studies, we have attempted to correlate the low platelet count and type of malaria. This study was conducted in Mangalore, a picturesque city in southern India, on the shore of the Arabian Sea. Malaria is endemic in this city and has already killed more than 300 people in the past 15 years[4].

2. Materials and methods

This was a retrospective study of medical records of children, admitted to Father Muller Medical College Hospital Mangalore, in costal Karnataka, India, with the diagnosis of malaria. The study period was between January 2010 to June 2011. Inclusion criteria was children <15 years with a diagnosis of malaria. Patients with history or clinical features suggesting chronic liver disease and those with

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history of bleeding disorder, haematological malignancy and those with history of intake of haemolytic agents were excluded from the study. The proforma included the details of patients, investigations and management.

Thrombocytopenia was defined as platelet count of less than 150 000 cells/μL. Patients were divided into three subgroups based on platelet count. Thrombocytopenia was considered severe if platelet count less than 50000 cells/μL, moderate if between 50000 and 100000 cells/μL, and mild if between 100000 and 150000 cells/μL. Data were analyzed by *Chi* square test using the SPSS version 13.0. A *P*-value of less than 0.05 was taken as significant.

3. Results

A total of 190 patients had malaria during the study period, out of which 159 patients [87 (54%) males, 72 (46%) females] met the inclusion criteria (Figure 1). Majority of the patients were between 13-15 years (33%) (Table 1) with mean age of presentation (9±4 years). Mean haemoglobin was (10.5±2 gm%). Platelet count ranged from 11700 to 319000 cells/μL, with a mean of (119952±62000 cells/μL). Least documented platelet count was 11700/μL. In the study group of 159 patients, 106 (66%) had vivax, 26 (16%) had falciparum and 27 (18%) had mixed (both vivax and falciparum) infection. Out of 106 cases detected with vivax malaria, 70 cases had platelet count less than 150000/μL out of which 14 (13%) patients had a platelet count less than 50000 /μL. Out of the 26 patients detected with falciparum malaria 21 (80%) patients had platelet count less than 150000/μL in which 10 (39%) patients had severe thrombocytopenia. It was noted that severe thrombocytopenia was more common with falciparum than in vivax infection. However, these differences did not reach statistical significance (Table 2). There was no significant difference in the rate of occurrence of thrombocytopenia in children among different age groups (Table 3). None of the patients had bleeding manifestation and their platelet counts improved spontaneously with antimalarial treatment. None of them required platelet transfusion.

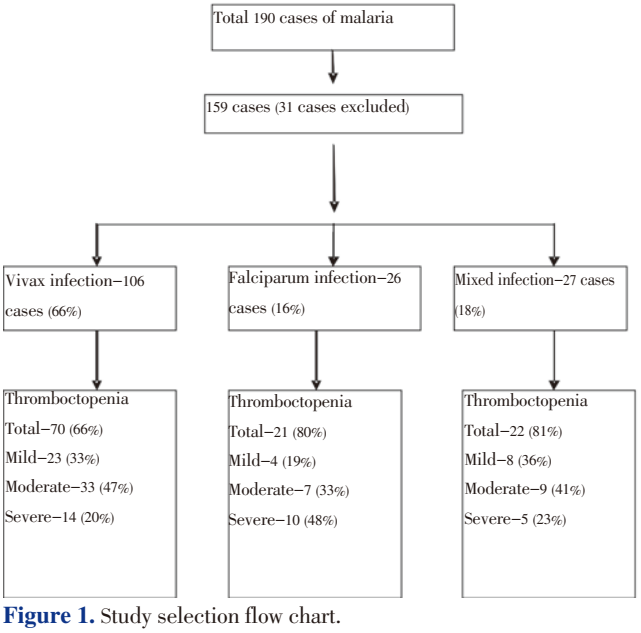

Figure 1. Study selection flow chart.

Table 1
Age and sex distribution of patients with malaria.

Age group (years)	No. of cases	Male	Female	Percentage (%)
1- 3	25	16	9	16
4-6	33	20	13	21
7-9	26	18	8	16
10-12	23	10	13	14
13-15	52	23	29	33
Total	159	87	72	100

Table 2
Platelet counts in patients with different types of malaria [*n* (%)].

Category	>150000/μL	150000-100000/ μL	100000-50000/ μL	<50000/μL	Total
P. vivax	36 (34)	23 (22)	33 (31)	14 (13)	106
P. falciparum	5 (19)	4 (15)	7 (27)	10 (39)	26
Mixed	5 (19)	8 (30)	9 (33)	5 (18)	27
Total	46 (29)	35 (22)	49 (31)	29 (18)	159

Table 3
Platelet count in malaria patients of different age groups [*n* (%)].

Age (years)	>150000/μL	150000-100000/μL	100000-50000/μL	<50000 /μL	Total
1-3	12 (48)	5 (20)	4 (16)	4 (16)	25
4-6	8 (24)	7 (21)	11 (34)	7 (21)	33
7-9	5 (19)	8 (30)	9 (33)	5 (18)	26
10-12	4 (15)	9 (35)	11 (42)	2 (8)	23
13-15	14 (27)	8 (15)	18 (35)	12 (23)	52
Total	46 (29)	35 (22)	49 (31)	29 (18)	159

4. Discussion

Malaria caused by *P. vivax* and *P. falciparum* is endemic in many parts of India including Mangalore[4]. Malaria affects almost all blood components and is a true haematological infectious disease. Thrombocytopenia and anemia are the most frequently malaria associated haematological complications of marlaria. In endemic areas, malaria has been reported as the major cause of low platelet counts. This is so characteristic of malaria, that in some places, it is used as an indicator of malaria in patients presenting with fever. Platelet counts of less than 150×10^9/L increase the likelihood of malaria by 12-15 times[5-7].

P. vivax was the common species in our study, though many of the patients who were included in our study had mixed infection (17%) with both *P. falciparum* and *P. vivax*. Faseela *et al*[8] in her study found similar results, which were attributed to endemicity for malaria in that area. Colonel *et al*[9] from Pakistan reported thrombocytopenia in 72% patients with malaria infection. Jamal *et al*[10], in their study on paediatric patients from Karachi, have reported low platelet counts in 72% of their patients who were suffering from malaria infection. But few studies[5,11] reported slightly lower incidence of thrombocytopenia like 40% and 58.97%. In our study thrombocytopenia was found in 70% of patients. Mild to moderate thrombocytopenia was more common than severe thrombocytopenia. There was no significant difference in severity between species.

P. vivax malaria is commonly associated with mild hematological abnormalities. Although severe thrombocytopenia is commonly reported to be associated with *P. falciparum* infection and has been reported to occur in patients coinfected with both *P. falciparum* and *P. vivax*, its occurrence has been rarely reported in cases of *P. vivax* malaria[12-14]. In our study thrombocytopenia was observed in 66% of patient with vivax malaria, in that 13% had severe thrombocytopenia.

Profound thrombocytopenia with platelet count as low as 5 000/μL has been reported in the Indian literature in a 43-year old female patient with vivax malaria[15]. The least platelet documented in our study was 11 700/μL, and it was seen in vivax infection. Counts less than or equal to 20 000/μL were noted in 2.5% of the subjects without any evident bleeding. This is consistent with the other study done in India[16].

The causes of thrombocytopenia in acute malaria are poorly understood. Experimental data and clinical studies have successively emphasized the role of immune factors and the destruction or sequestration of platelets. Immune mechanisms involving specific platelet-associated IgG antibodies that bind directly to the malarial antigen in the platelets have been recently reported to play a role in the lysis of platelets and the development of thrombocytopenia. Decreased thrombopoiesis has been ruled out, because platelet-forming megakaryocytes in the marrow are usually normal or increased[5,12,17,18]. A good tolerance of low platelet counts is well known in malaria. This could be explained by platelet activation and an enhanced aggregability[6]. In most of the studies, including ours thrombocytopenia has not been associated with death in malaria. It usually disappears with the treatment of the disease and requires no treatment for itself.

It is a general consensus that thrombocytopenia is very common in malaria and it is usually believed to be more common in falciparum malaria. Contrary to the popular belief, vivax infection can give rise to thrombocytopenia as was seen in our study. In conclusion, we found significant thrombocytopenia in almost two third of our patients with malaria. Presence of thrombocytopenia is not a distinguishing feature between the two types of malaria and it has got a benign course and improves with treatment. Malaria should be a consideration in febrile patients with low platelets.

Conflict of interest statement

We declare that we have no conflict of interest.

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