

CORRELATION OF THROMBOCYTOPENIA IN URBAN CHILDREN WITH MALARIA

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ABSTRACT

Background: Malaria, is endemic in Surat, (an industrious city of Gujarat), which is categorised under High risk zone. Malaria affects all blood components and is a true haematological disease. Thrombocytopenia and anaemia are the most frequently malaria associated haematological complications of malaria.

Aims & Objective: To study the occurrence, severity and correlation of Thrombocytopenia in urban children with malaria.

Materials and Methods: A retrospective study was conducted at Surat Municipal Institute Of Medical Education and Research (SMIMER), Surat Gujarat. The Data of all smear positive and Rapid Diagnostic Test positive malaria cases of age between 1 and 17 year admitted in the Deptt. Of Pediatrics were collected. These patients were further assessed for thrombocytopenia, its severity, its relation with type of malaria and age.

Results: Thrombocytopenia was observed in 233 (74%) cases of Malaria of which *P. vivax* was in 103 (44%) cases, *P. falciparum* in 130(56%) cases. Severe thrombocytopenia was observed in 22% and 29% cases of Pv and Pf malaria respectively. Sensitivity of thrombocytopenia in Pv and Pf was 71.53% and 76.92% whereas specificity was 66.67 for both respectively. Sensitivity of thrombocytopenia in Pv increased as the platelet count decreased.

Conclusion: Thrombocytopenia is a frequent overall manifestation of both falciparum and Vivax malaria Severe Thrombocytopenia should alert one to consider a possibility of malaria in children.

Key Words: Thrombocytopenia; Plasmodium Vivax (Pv); Plasmodium Falciparum (Pf); Severe Malaria

Introduction

Malaria is one of the major public health problems of the country. Around 1.5 million confirmed cases are reported annually by the National Vector Borne Disease Control Programme (NVBDCP), of which about 50% are due to Pf.^[1] Pv is traditionally known to cause benign tertian malaria, although recent reports suggest that Pv can also cause severe life-threatening disease analogous to severe infection due to Pf.^[2]

There are limited published data on the clinical and epidemiological profiles of children suffering from 'severe malaria' in an urban setting of India. Urban malaria constitutes 15% of the burden of the disease in India.^[3] Thrombocytopenia has been reported to be associated with malaria with an incidence ranging from 60-80%, with some studies reporting a lower incidence in Pf malaria as compared to Pv malaria.^[4] As there are limited data in urban children with malaria from Indian studies, this study is an attempt to correlate the platelet count and type of Malaria in urban children.

Materials and Methods

Retrospectively data of 325 patients (1 – 17 years) diagnosed as acute malaria, admitted in Pediatric

Department of SMIMER were collected for six months from July 2010 to December 2010. Out of 325 cases, 313 cases with smear positive for malaria and those with acute history of fever with rapid diagnostic test positive for Pf and Pv were included. Twelve cases of mixed malaria infections out of 325 patients were excluded. Those malaria cases with other co infections were also not included in study. Total of 105 Patients with acute history of fever with smear and RDT negative for malaria were taken as controls. Malaria was diagnosed by conventional microscopy on thick and thin smears and by Rapid diagnostic kit (as available in the Institute) manufactured by SD Bio standard diagnostics Malaria Antigen Pan Bio Line for diagnosing Pf, Pv and mixed infections. Platelet counts were carried out by 3-part cell counter (Abacus Model Sr.No. 803734).

Thrombocytopenia was defined as platelet count of less than 1,50,000 cells/ μ L. Patients were divided into three subgroups based on platelet counts. Thrombocytopenia was considered severe, when platelet count was less than 50,000 / μ L, moderate between 50,000-1,00,000 cells/ μ L, and mild between 1,00,001 -1,50,000 cells/ μ L. Data were analysed by Chi square test using SPSS version 13.0.A. Wilson score were applied for finding sensitivity & specificity and positive & negative predictive values.

Results

Out of 313 patients, 205 (65%) patients were male and 108(35%) were females with male: female ratio of 1.9:1 (Table-1). Majority of the patients were in 1-6 year age group constituting (42%). Mean age of presentation was (8 ± 5 year).Mean haemoglobin was (8.8 ± 2.5 gm). Total no. of patients having thrombocytopenia with malaria was 233. Platelet count ranged from 12,000-6,54,000 cells/μL with a mean of (118447 ± 99806/μL). On comparing type of malaria with gender/ sex it was statistically significant (p value < 0.01) (Table -2). Lowest documented platelet count was 12,000 cells/μL which was in Pv malaria whereas it was 15000 in case of Pf malaria. Out, of 313 cases of malaria, 169 (54%) had Pf, 144 (46%) had Pv. Thrombocytopenia decreased as the age advanced from 1-3 year (33 and 35) to 16-17 year (20 and 18) yr in both (Pf & Pv) respectively.

Thrombocytopenia was more common with Pf group than Pv group however the difference was not statistically significant (p>0.05). Out of the 144 cases of Pv malaria, 103 (72%) patients had thrombocytopenia of which, 32 (31%) had severe thrombocytopenia. Out 169 patients of Pf malaria 130 (77%) cases had thrombocytopenia, of which 49 (38%) had severe thrombocytopenia (< 50,000 cells/μL). Overall Sensitivity of thrombocytopenia as a predictor of malaria was 74% (Table-3).Sensitivity in Pv and Pf was 71.53% and 76.92%, whereas specificity was 66.67% for both Pv & Pf (Table-3).

Table-1: Age and sex distribution of patients with Malaria

Age Group (Years)	Male (%)	Female (%)	Total (%)
1-3	36 (18)	28 (26)	64 (20)
4-6	43 (21)	26 (24)	69 (22)
7-9	16 (8)	17 (16)	33 (11)
10-12	41 (20)	13 (12)	54 (17)
13-15	40 (20)	13 (12)	53 (17)
16-17	29 (13)	11 (10)	40 (13)
Total	205 (65)	108 (35)	313 (100)

Table-2: Correlation between Gender & Type of Malaria

Species	Gender		
	Male (%)	Female (%)	Total (%)
P. vivax	81(56)	63(44)	144 (100)
P. falciparum	126(75)	43(25)	169 (100)
Total	207(66)	106(34)	313 (100)

Table-3: Thrombocytopenia as a Predictor in Different types of Malaria in children

Types of Malaria	Sensitivity % (CI)	Specificity % (CI)	PPV % (CI)	NPV % (CI)	Prevalence % (CI)
Pf & Pv	74.44 (68.13-78.22)	66.67 (56.80-75.56)	86.94 (82.31-90.73)	46.67 (38.49-54.98)	74.88 (70.44-78.97)
Pf	76.92 (69.83-83.05)	66.67 (56.80-75.56)	78.79 (71.75-84.76)	64.22 (54.47-73.17)	61.68 (56.25-67.95)
Pv	71.53 (63.42-78.73)	66.67 (56.80-75.56)	74.64 (66.53-81.65)	63.06 (53.38-72.03)	57.83 (51.43-64.04)

Pv: P. vivax; Pf: P. falciparum; PPV: Positive predictive value; NPV: Negative predictive value; CI: Confidence interval

Discussion

In endemic area, 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 150x 10⁹/L increases the likelihood of malaria by 12-15 times.^[5-7]

In our study Pv malaria was second to Pf malaria. Mixed infection (Pv and Pf) was 4% in our study and Gupta et al^[8], whereas it was 17% in the study of Shetty et al.^[9] Thrombocytopenia in malaria was found in 74% of cases in our study, similarly Colonel et al^[10] and Jamal et al^[11] have reported thrombocytopenia in 72% patients with malaria infection. Shetty et al from Mangalore, also reported thrombocytopenia in 72% cases of malaria infection. Thrombocytopenia was 72% in Pv cases of malaria in our and in Shetty et al study whereas, it was 73% in Tanwar et al^[12] study.

Moderate to severe thrombocytopenia was more common in both Pv (78%) and Pf malaria (76%) than mild thrombocytopenia in both Pv (22%) and Pf (24%) in our study. Although severe thrombocytopenia is commonly reported to be associated with Pf infection and has been reported to occur in patients co-infected with both Pf and Pv malaria its occurrence has rarely been associated with Pv malaria.^[13-15] In our study thrombocytopenia was observed in 72% cases with Pv malaria of which 22% had severe thrombocytopenia, Shetty et al had thrombocytopenia in 66% of Pv, out of which 13% had severe thrombocytopenia, both studies were conducted in pediatric age group.

Sensitivity & Specificity of thrombocytopenia as a predictor of malaria was 80% & 81%, respectively in Mahmood et al^[16], 60% & 88%, respectively in Lathia et al^[17], 78% & 94%, respectively in Khan & Abbas^[18] studies, in our study it was 74% & 67%, respectively. However all these studies were carried out in adult patients as against pediatric patients in our study. Thrombocytopenia is not usually associated with mortality and it disappears with antimalarial treatment. Generally, it is considered that thrombocytopenia is very common in malaria and is believed to be more common in Pf malaria, however, contrary to the popular belief, P. vivax infection can also give rise to thrombocytopenia.

Conclusion

Presence of thrombocytopenia in patients with acute

fevers has a good diagnostic possibility of malaria not only in adults but also in pediatric patients and this is more with degree of severity of thrombocytopenia. However the degree of thrombocytopenia is not useful to differentiate the types viz. Falciparum or Vivax malaria. The Limitation of the study is that Prognostic value of thrombocytopenia in different types of malaria were not analysed.

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