

A study of frequency of occurrence and severity of thrombocytopenia in malaria in 2 months to 18-year-old children in a tertiary care centre at rural Haryana

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Received - 23 August 2017

Initial Review - 26 September 2017

Published Online - 26 October 2017

ABSTRACT

Objective: To study the frequency and severity of thrombocytopenia in children between age groups of 2 months and 18 years with malaria. **Materials and Methods:** It was a prospective study conducted at tertiary care centre of rural Haryana. Data of confirmed cases of malaria with regard to age, sex, and platelet count were recorded in pre-defined pro forma. **Results:** Out of total 79 confirmed cases of malaria, 67 (84.81%) cases of *Plasmodium vivax*, 10 (12.65%) cases of *Plasmodium falciparum*, and 2 (2.53%) cases of mixed type were observed. Total 58 (73.41%) cases had thrombocytopenia. A total of 50 (74.62%) and 6 (60%) cases had thrombocytopenia in *P. vivax* and *P. falciparum*, respectively. Total 17 patients (*P. vivax* - 14, *P. falciparum* - 2, and mixed - 1) had severe thrombocytopenia (platelet count <50,000/ μ l). Maximum number of the patients belonged to the adolescent age group and was found to statistically significant. **Conclusion:** Thrombocytopenia is a sensitive indicator for diagnosis of malaria. In a febrile patient with thrombocytopenia, malaria should always be suspected.

Key words: Children, Malaria, Mixed Infection, Thrombocytopenia

Malaria is one of the most prevalent and oldest known human infections causing morbidity and mortality in children worldwide. Malaria is caused by a protozoa plasmodium which infects humans and multiplies in red blood cells (RBCs) and causes destruction of these RBCs. Four species of plasmodium parasites are known to cause infections are *Plasmodium vivax*, *Plasmodium falciparum*, *Plasmodium ovale*, and *Plasmodium malariae*. There were 212 million new cases of malaria worldwide in 2015. The African countries accounted for the most of the global cases of malaria (90%) followed by South-East Asia region (7%) and the Eastern Mediterranean Region (2%). In 2015, there were 429,000 deaths worldwide [1]. Thrombocytopenia has been reported in both types of species ranging from 60 to 80% of cases with a lower incidence in *P. vivax* [2-4]. The exact cause of thrombocytopenia in malaria is still not well understood. The most probable mechanism causing thrombocytopenia are bone marrow depression, hypersplenism, coagulation disturbances, immune-mediated platelet destruction, and oxidative stress [3,5,6]. Thrombocytopenia is a sensitive indicator of malaria infection and any child having a fever with thrombocytopenia raise the suspicion of malarial infection especially in endemic areas of malaria. The aim of our study was to see the frequency of occurrence and also severity of thrombocytopenia in cases of malaria admitted to our hospital.

MATERIALS AND METHODS

This study was a prospective study conducted tertiary care centre of rural Haryana, India from October 2014 to August 2016 after obtaining permission from the Institutional Ethical Committee. All the confirmed cases of malaria in children between age of 2 months and 18 years either positive in peripheral blood smear or with rapid antigen test or by both were included in the study. Cases with only clinical diagnosis were excluded from the study. All the cases for the study were recorded in pre-defined pro forma with relevance to age, sex, type of species of malaria parasite, complete blood count, peripheral smear examination, report of rapid antigen test, and platelet count done within 24 h of admission.

About 5 ml of venous blood was drawn under aseptic precautions in a sterile bulb from selected patients. Serum was

Table 1: Distribution of patients according to age and sex groups

Age groups (years)	Male	Female	Total (%)	p
2 months-3 years	4	1	5 (6.32)	0.11
3-6	5	4	9 (11.39)	0.55
6-9	10	6	16 (20.25)	1.0
9-12	6	5	11 (13.92)	0.88
12-18	26	12	38 (48.10)	<0.00001
Total	51	28	79 (100)	

Table 2: Platelet counts with different types of malaria

Malaria species	<10,000/ μ l	10,000- <50,000/ μ l	50,000- < 1,00000/ μ l	100,000- <1,50,000/ μ l	1,50,000/ μ l and above	p
<i>P. vivax</i>	0	14	19	17	17	0.95
<i>P. falciparum</i>	0	2	3	1	4	
Mixed type	0	1	1	0	0	
Total	0	17	23	18	21	

P. vivax: *Plasmodium vivax*, *P. falciparum*: *Plasmodium falciparum*

separated by centrifugation and was used for analysis. Complete blood count was determined using microns 60 autoanalyzer. The autoanalyzer works on the principle of cell counting and sizing based on the measurements of changes in electrical resistance produced by a particle suspended in conductive diluents traversing a small aperture. Thrombocytopenia was defined as platelet count <150,000/ μ l and mild, moderate, and severe thrombocytopenia were defined as count between 100,000 and 150,000/ μ l, 50,000-100,000/ μ l, and <50,000/ μ l, respectively [7]. Patients of malaria in our hospital are managed as per the latest protocol recommended by National Malaria Control Programme of Government of India. Statistical analysis was performed by Chi-square test to analyze the difference between proportions.

RESULTS

A total of 79 patients were diagnosed as malaria during the study period. All the cases were either smear or rapid antigen or both positive. Table 1 summarizes the age and sex distribution of patients. Out of 79 cases, 51 (64.55%) were males, and 28 (35.45%) were females. Maximum number of patients were between 10 and 18 years of age (48.10%) followed by age group between 6 and 9 years of age (20.25%). Table 2 summarizes the platelet counts in malaria species. Out of 79 patients, 67 (84.81%) had *P. vivax* and 10 (12.65%) had *P. falciparum* infections. Total 58 (73.41%) had thrombocytopenia. Among 67 *P. vivax* cases, 50 (74.62%) and out of 10 patients of falciparum, 6 (60%) had thrombocytopenia. Least documented thrombocytopenia was observed as 10,000/ μ l within a patient with *P. vivax* infection.

Regarding severity of thrombocytopenia, out of 67 patients of vivax and 10 patients of falciparum, 14 (20.89%) and 2 (20%) cases had severe thrombocytopenia, respectively. Majority of the patients in both species had mild to moderate thrombocytopenia.

DISCUSSION

Malaria is endemic in many parts of the India. In most of the studies, anemia and thrombocytopenia are the most common hematological findings in malaria. In malaria, thrombocytopenia is usually mild to moderate in severity and rarely causes bleeding manifestations [4]. In endemic areas, it is one of the major causes of thrombocytopenia having good sensitivity but poor specificity. In this study, males were predominantly (64.55%) affected than the females. It is most likely due to be more outdoor activities by males and also could be due to females are better clothed most of the hours; especially, this difference is more in rural areas. Similar

findings were reported by Patel et al. (66.14% male) [8]. Most of the studies reported had male predominance; although it was non-significant statistically in our study.

The maximum number of patients belonged to adolescent age group followed by age group between 6 and 9 years, and it was found statistically significant. This may be due to more outdoor activity in adolescents leading to more exposure to mosquitos. We observed *P. vivax* (84.10%) cases much higher than the *P. falciparum* (12.65%) cases. It is comparable to the results of other Indian studies [7-10]. In our study, out of 79 patients, 58 (73.41%) had thrombocytopenia. Similar observations were reported by Colonel et al. (72%) and Jamal et al. (72%) [2,3]. Meena et al. reported very high rate of 98% in their study [7]. Other studies that show higher results were by Sheikh et al. (80.6%), and Solanki et al. (87.09%) [11,12]. Moulin et al. reported relatively lower incidence (43.50%) with *P. falciparum* infections [13].

Regarding severity of thrombocytopenia, majority were observed as mild to moderate. Severe thrombocytopenia was found in vivax and falciparum as 20.89% and 20%, respectively. Although severe thrombocytopenia has been reported more with *P. falciparum*, in most of the studies, it was almost similar (20.89% in vivax and 20% in falciparum) to the results of our study [14]. Differences of the severity among these groups were found statistically non-significant [15]. Limitations of our study were that we did not correlate the severity of the thrombocytopenia with the severity of clinical conditions. Furthermore, we took only the first platelet count after hospitalization and we did not see the response to treatment.

CONCLUSION

This study highlights the importance of thrombocytopenia in the diagnosis of malaria. In a febrile child having thrombocytopenia, we should have a strong suspicion of malaria. Thrombocytopenia in malaria is usually a benign complication as no any child had bleeding manifestations in our study.

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Funding: None; Conflict of Interest: None Stated.

How to cite this article: Narayan R, Singh S. A study of frequency of occurrence and severity of thrombocytopenia in malaria in 2 months to 18-year-old children in a tertiary care centre at rural Haryana. *Indian J Child Health.* 2017; 4(4):527-529.