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ORIGINAL ARTICLE

Frequency of Thrombocytopenia in Plasmodium VIVAX Malaria Among Children

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ABSTRACT

Objective: The purpose of the study was to quantify the incidence of thrombocytopenia in paediatric plasmodium vivax malaria.

Methods: After the approval from institution review board, this cross-sectional study was conducted at Department of Paediatrics, Hayatabad Medical Complex, Peshawar, from 5 October 2018 to 5 April 2019. A total of 172 children's were recruited in this research. At first, those who had a sudden start of a fever without any other symptoms were chosen. It was determined that the patient had hepatosplenomegaly and was treated accordingly. Blood tests, such as thick and thin smear microscopy, were performed on people who were thought to have malaria. Patients who met the study's inclusion and exclusion criteria were considered for participation. The peripheral smear was used to test for thrombocytopenia in patients with vivax malaria.

Results: Mean ± S. D of age of the study participants was 7±7.85years. Among the study participants, 65% were male and 35% were females. Mean ± S. D of fever duration of the study participants was 4 ± 2.73 days, with 33 % have fever duration less than and equal to 4 days, while 67% of the study participants have more than 4 days. In 5% of study participants previous history of malaria and malaria vivax was observed, and 3% of the study participants have suffered from congenital malaria. Mean ± S. D of gestational age of the study participants was 37 ±3.21 weeks. Among the 172 recruited participants 68% had thrombocytopenia.

Conclusion: Our study concludes that the frequency of thrombocytopenia was 68% in children presenting with in plasmodium vivax malaria.

Keywords: thrombocytopenia, plasmodium, vivax malaria, children

INTRODUCTION

Millions of people still die every year from Plasmodium infections, making them a serious global health concern (1). While though P. falciparum is responsible for the vast majority of instances of severe complications and malaria-associated death (2), vivax malaria has now clearly emerged as a potentially deadly illness (3, 4). There are an estimated 2.85 billion individuals who might get infected with P. vivax and suffer serious health consequences as a result of the disease (5). P. vivax and P. falciparum both cause malaria, although the most frequent haematological consequences are thrombocytopenia and anaemia (6, 7). The high prevalence of thrombocytopenia in malaria patients has been recorded in several investigations (8, 9), including those conducted in Manaus, in the Brazilian Amazon. Patients with vivax mono-infection verified by PCR (10, 11) often have severe thrombocytopenia (platelet count 20103/mm3). During the course of more than four decades of study, the specific mechanism producing malaria thrombocytopenia has not been understood. Nonetheless, there is mounting evidence that thrombocytopenia in malaria is caused by a combination of factors, including an increase in platelet breakdown and consumption (12). Low platelet counts are not usually followed by significant bleeding (8). Nevertheless, several investigations have shown bleeding linked with thrombocytopenia in malaria (11, 13). Malaria-induced thrombocytopenia has been explained in many ways (12, 14-20). Activation [20] and/or death (14) of platelets have been hypothesised to contribute to the low platelet numbers in malaria (12, 15). Nevertheless, it has also been suggested that damaged platelets may be sequestered in the spleen and subsequently phagocytised by splenic macrophages due to immunological complexes formed by malarial antigen (16–19). Klein and Ronez (21) have shown a blood smear from a P. falciparum patient that is consistent with peripheral hemophagocytosis. This individual's thrombocytopenia was severe, and platelet-like particles were seen inside of monocytes (21). A patient report from almost 20 years ago demonstrated platelet phagocytosis in malaria, with 80% of circulating monocytes displaying platelets within (22). Malaria caused by the Plasmodium falciparum parasite is a major health problem in India, Nepal, Bangladesh, and Pakistan. Malaria affects at least 5,000 people per year in Pakistan, making it a significant issue in terms of public health (23). The present study aims to examine the incidence of thrombocytopenia in paediatric plasmodium vivax malaria cases.

METHODOLOGY

After the approval from institution review board, this cross-sectional study was conducted at Department of Paediatrics, Hayatabad Medical Complex, Peshawar, from 5 October 2018 to 5 April 2019. Through non-probability sampling technique, patients between age 2-15 years, both gender, and patients having vivax malaria based on thick and thin smear microscope examination were included in the study. Patients with thrombocytopenia due to idiopathic thrombocytopenia purpura, as shown by the appearance of numerous cutaneous petechiae, an elevated bleeding time (BT)>10 minutes, and a platelet count of less than 150,000 per microliter and patients with malaria parasites other than plasmodium vivax or with mixed malaria, as determined by microscopic analysis of thick and thin smears were excluded from the study. Each patient's caretaker was given an explanation of the study's goals and intended benefits, and their agreement was acquired before any patient data were collected. Then, those who had a sudden start of fever with no other symptoms were chosen. The patient was checked for hepatosplenomegaly. Thick and thin smear microscopy were used to investigate possible instances of malaria. Patients who met the study's inclusion and exclusion criteria were considered for participation. It was determined whether or not patients with vivax malaria had thrombocytopenia by doing a peripheral smear. The patients' information was entered onto standardised forms. Statistical analysis was performed in SPSS 20. In this study, no descriptive statistics were generated for any of the variables. Categorical factors such as gender, age, history of malaria, history of congenital malaria, and thrombocytopenia were broken down into frequencies and percentages. Continuous variables like as age, gestational age at birth, and fever duration in days were used to determine means

and standard deviations. Age, gender, history of malaria, history of vivax malaria, history of congenital malaria, gestational age at birth, and duration of fever were all used to create stratified analyses of the impact of malaria on thrombocytopenia. We used a chi-square test after we had already divided the sample into different groups, and a significance level of ≤0.05 was used to determine if anything was indeed significant. Tables and graphs were used to display all of the findings.

RESULTS

A total of 172 children were recruited in the present study, their clinical and demographic parameters were shown in table 1. Mean ± S. D of age of the study participants was 7±7.85years. Among the study participants, 65% were male and 35% were females. Mean ± S. D of fever duration of the study participants was 4 ± 2.73 days, with 33 % have fever duration less than and equal to 4 days, while 67% of the study participants have more than 4 days. In 5% of study participants previous history of malaria and malaria vivax was observed, and 3% of the study participants have suffered from congenital malaria. Mean ± S. D of gestational age of the study participants was 37 ±3.21 weeks. Among the 172 recruited participants 68% had thrombocytopenia. Stratification of thrombocytopenia with respect to age, gender, previous history of malaria, previous history of vivax malaria, history of congenital malaria, gestational age at birth and duration of fever is given in table 2.

Table 1: Clinical and demographic parameters of the study participants

Parameters	N (%)
Age distribution (mean ± S. D)	7±7.85
2-7 years	72 (42%)
7-15 years	100 (58%)
Gender distribution	
Male	112 (65%)
Female	60 (35%)
Duration of Fever (mean ± S. D)	4 ± 2.73
≤ 4 days	57 (33%)
>4days	115 (67%)
Previous History of Malaria	
Yes	9 (5%)
No	163 (95%)
Previous History of Malaria Vivax	
Yes	9 (5%)
No	163 (95%)
Previous History of Congenital Malaria	
Yes	5 (3%)
No	167 (97%)
Gestational Age at Birth	37 ±3.21
38-39 weeks	103 (60%)
39-42 weeks	69 (40%)
Incidence of Thrombocytopenia	
Yes	117 (68%)
No	55 (32%)

Table 2: Stratification of thrombocytopenia

Parameters	Thrombocytopenia		P Value
	Yes	NO	
Age distribution			
2-7 years	49	23	0.9938
7-15 years	68	32	
Gender distribution			
Male	76	36	0.9491
Female	41	19	
Duration of Fever			
≤ 4 days	39	18	0.9372
>4days	78	37	
Previous History of Malaria			
Yes	6	3	0.9285
No	111	52	
Previous History of Malaria Vivax			
Yes	6	3	0.9285
No	111	52	
Previous History of Congenital Malaria			
Yes	3	2	0.6962
No	114	53	
Gestational Age at Birth			
38-39 weeks	70	33	0.9829
39-42 weeks	27	22	

DISCUSSION

In the underdeveloped world, malaria is a serious public health issue and a leading cause of death among children. It is a high mortality rate, and if it isn't treated, it may worsen due to a variety of haematological problems. As such, they may provide the foundation for effective malaria management (24) if their roles as risk factors for severe illness development are established. There were an estimated 214 million cases of malaria in 2015. There were 275,149 cases of malaria and 56 fatalities in Pakistan (25). Determining the extent of thrombocytopenia is also crucial, both in terms of treatment and prognosis3. While it is not a need for severe malaria, thrombocytopenia is one of the most prevalent consequences of both Plasmodium vivax and Plasmodium falciparum malaria. The average age of the participants was 7 years old, with a standard deviation of 7.85 years. There were 65% male patients and 35% female patients. Almost two-thirds of the kids had low platelet counts. In another research, Hafeez et al., (26) also reported that among 374 children with malaria, 51.3% developed thrombocytopenia. One research looking at the connection between malaria and thrombocytopenia mortality found that 30.8% of patients with clinical malaria were also suffering from thrombocytopenia. One point three percent of patients died. Another research with similar findings was done by Gupta NK et al., (27), who followed 230 patients and discovered that 56.51 percent of them tested positive for Plasmodium vivax, 39.13 percent for Plasmodium falciparum, and 4.34 percent for a combined infection of both species. 100 of the 130 people who tested positive for vivax malaria also had low platelet counts. Seventy of the ninety instances of falciparum malaria were accompanied by thrombocytopenia. Nine out of ten patients with a mixed infection also suffered from low platelet counts. When O'Brien AT et al., (28) examined 16 instances of severe vivax malaria, they also discovered that 65% of them were accompanied by severe thrombocytopenia.

CONCLUSION

Our findings indicate that 68% of children presenting with plasmodium vivax malaria had thrombocytopenia. Plasmodium vivax malaria is associated with a decrease in platelet count. It's useful for diagnosis; in conjunction with a clinical evaluation, it may raise the likelihood that malaria is the problem. It is our recommendation that all patients presenting with acute febrile sickness in an endemic location have their platelet count tested. It will aid in early detection of malarial infection.

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