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ORIGINAL RESEARCH

THROMBOCYTOSIS ASSOCIATED WITH INFECTION IN CHILDREN: A CROSS-SECTIONAL STUDY FROM RURAL TAMILNADU

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ABSTRACT

Background: Thrombocytosis refers to an increase in the number of platelets to levels above 400,000/μL. This condition is frequently observed in infancy and youth, affecting between 3 to 13% of children. The present study was undertaken to identify the pattern and severity of thrombocytosis in children with various infections and to analyze mean platelet volume (MPV) and platelet distribution width (PDW) in those patients.

Methods: This study was a hospital based analytical cross-sectional study conducted in the Department of Pediatrics, Dhanalakshmi Srinivasan Institute of Medical Sciences and Hospital, Perambalur. The study included 300 children with thrombocytosis. They were divided into two groups after confirming thrombocytosis by peripheral smear. Group 1 included children with thrombocytosis due to infections, and Group 2 included children with thrombocytosis due to other causes.

Results: In the present study, Out of 300 patients with thrombocytosis, 203 patients (67.6%) had infection associated thrombocytosis (group 1).Infection associated thrombocytosis was more common in children aged less than 1 year (37%) with a predominance in boys (1.3:1). The platelet count was significantly higher in group 1 than group 2. Among infections, respiratory tract infections (43.8%) were the most common. The majority of the children had only mild thrombocytosis. The comparison of platelet indices among two groups didn't show any significant differences [mean of MPV in group 1 (7.48 ± 0.89) vs. group 2 (7.47 ± 0.87) (p-0.842) and mean PDW of group 1 (16.59 ± 0.73) vs group 2 (16.52± 0.80)].

Conclusion: Thrombocytosis was a frequent finding in children with infections, especially respiratory tract infections, and in boys younger than 1 year. Platelet count was significantly higher in patients with infection associated thrombocytosis, and the presence of fever is significantly correlating with the severity of thrombocytosis. There was no statistically significant difference in platelet indices.

Keywords: Thrombocytosis, Infection, Thromboembolic events

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INTRODUCTION

Thrombocytosis refers to an increase in the number of platelets to levels above 400,000/µL. This condition is frequently observed in infancy and youth, affecting between 3 to 13% of children. Extreme thrombocytosis, defined as a platelet count over 1,000,000/µL, is a rare condition that affects less than 2% of children. However, it may be more prevalent in children who are critically unwell. The increased platelet count in children is typically caused by acute infection, chronic inflammation, collagen vascular and renal disorders, Langerhan's cell histiocytosis, iron deficiency, hemolytic anemia, and Kawasaki disease (KD). Secondary thrombocytosis in children can also be caused by drugs, although this is less common. Splenectomy can lead to an excessive increase in platelet count, However, this condition does not often have any physical effects unless it is accompanied by thrombophilic variables.[1,2]

An increased platelet count has emerged as a significant clinical issue for distinguishing between different pathological and healthy processes. Thrombocytosis is categorized based on its source into primary and secondary variants. Primary thrombocytosis is a condition characterized by the abnormal and uncontrolled growth of blood cells, namely those involved in clotting. This condition is likely to be accompanied by the formation of blood clots. Secondary thrombocytosis, also known as reactive thrombocytosis, occurs as a result of several underlying illnesses such as infection, inflammation, iron shortage, tissue injury, hemolysis, tumors, hyposplenism, and other factors that trigger an acute phase response. Distinguishing between these categories based solely on clinical criteria can be challenging at times.[3-5]

The present study was undertaken to identify the pattern and severity of thrombocytosis in children with various infections and to analyze mean platelet volume (MPV) and platelet distribution width (PDW) in those patient.

MATERIALS & METHOD

This hospital based cross-sectional study was conducted in the Department of Pediatrics, Dhanalakshmi Srinivasan Institute of Medical Sciences and Hospital, Perambalur. The study was undertaken for a period of 4 months among 300 children with thrombocytosis. They were divided into two groups after confirming thrombocytosis by peripheral smear. Group 1 included children with thrombocytosis due to infections, and Group 2 included children with thrombocytosis due to other causes. The study included 300 patients with thrombocytosis. Children aged less than 12 years of both genders were included in the study. Ethical committee approval was obtained from the Institutional Ethical Committee, Dhanalakshmi Srinivasan Institute of Medical Sciences and Hospital, Perambalur. The purpose and confidentiality of the study were explained to the parents/ caregivers of the children before administering the questionnaire.

In the present study,5ml of blood was drawn through venipuncture and the hematological parameters were studied. The study's participant children were split into two groups once a peripheral smear was used to demonstrate thrombocytosis. Children with thrombocytosis as a result of infections were included in Group 1, and children with thrombocytosis as a result of other causes were included in Group 2. The severity of thrombocytosis is graded as mild (400x103/µl -700x103/µl), Moderate (700x103/µl -900x103/µl) and severe (more than 900 x103 /µl).6 The data were entered using Microsoft excel. The data was analyzed using Statistical Package for the Social Sciences software. Descriptive statistics were expressed in frequency and percentages. Microsoft Excel was used to generate graphs.

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RESULTS

In this study, data was collected from 300 pediatric patients to study the pattern and severity of thrombocytosis. The age group of the study participants ranged from 1 month to 12 years, with the majority aged less than 1 year. In the present study, 174 (58%) of them were male, and remaining 126 (42%), were female. Majority of the study participants belonged to a nuclear family. Most of the study participants belong to class one social economic status Majority of the participants belonged to middle and lower middle class socioeconomic class as per modified BG Prasad scale.[7]

Among the children with infections, we observed that the common infections were respiratory Tract infections (43.8%), Urinary Tract infections (11.8%), Gastro-intestinal infections (9.6%), Hepato-biliary infections (5.4%), Central Nervous system infections (5.4%), Skin infections (4.9%) and musculoskeletal infections (0.9%). Infections involving Multisystem and infections due to other causes constituted 6.4 and 11.8% of the study participants respectively.

Thrombocytosis due to infections were observed among 203 patients. We also observed that mild thrombocytosis (87.7 %) was the most common presentation followed by moderate (8.9%) and severe (3.4%). Children with fever constituted 61.1% of the study population. Children who had a fever in group 1 had thrombocytosis with a greater degree of severity. There is a substantial correlation ($p = 0.02$) between the severity of thrombocytosis and the presence of fever. No thromboembolic events have been identified in any of the children, even in severe thrombocytosis.

We compared various platelet indices among both the groups. Our findings showed that the platelet counts were significantly higher among the patients who had thrombocytosis secondary to infections as compared to the other group. We observed no significant variations in the mean platelet volume and Platelet Distribution Width among bot the study groups.

Table 1: Socio-Demographic characteristics of the study participants (n=300)

	Frequency (n=300)	Percentage
Age		
< 1 year	111	37
1 – 5 years	99	33
5 – 10 years	63	21
> 10 years	27	9
Gender		
Male	174	58
Female	126	42
Family type		
Nuclear	204	68
Joint	96	32
Socio-economic status		
Class II	34	11.3
Class III	132	44
Class IV	126	42
Class V	8	2.7

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Table 2: Distribution of Infection parameters associated with Thrombocytosis (n=203)

	Frequency (n=203)	Percentage
Common Infections		
Respiratory Tract	89	43.8
Urinary Tract	24	11.8
GIT	19	9.6
Hepato-biliary	11	5.4
CNS Infection	11	5.4
Skin Infection	10	4.9
Musculoskeletal	2	0.9
Multisystem	13	6.4
Other	24	11.8
Thrombocytosis		
Mild	178	87.7
Moderate	18	8.9
Severe	7	3.4
Fever		
Yes	124	61.1
No	79	38.9

Table 3: Correlation between Fever and severity of Thrombocytosis (n=300)

Thrombocytosis	Fever		p value
	Present	Absent	
Mild	103	75	**0.02***
Moderate	14	4	
Severe	7	0	

**** p value less than 0.05 was considered to be statistically significant***

Table 4: Comparison of hematological parameters among the study participants (n=300)

	Group 1 (n=203) Mean ± SD	Group 2 (n=97) Mean ± SD	p value
Platelet count	523.31 ± 148.17	493 ± 142.59	**0.03***
Mean platelet volume	7.48 ± 0.89	7.47 ± 0.87	0.842
Platelet Distribution Width	16.59 ± 0.73	16.52 ± 0.80	0.145

**** p value less than 0.05 was considered to be statistically significant***

DISCUSSION

The present study was undertaken among the pediatric patients to study the pattern and severity of thrombocytosis in children with various infections and to analyze mean platelet volume

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(MPV) and platelet distribution width (PDW) in those patients. Among the patients with thrombocytosis, infectious origin was prevalent among 67.7% of the study participants.

The patients with thrombocytosis was common among children aged less than 1 years of age, with an increased male predominance. Subramaniam et al[8] had reported that the occurrence of reactive thrombocytosis in children demonstrates a pattern that varies depending on age. The highest occurrence has been observed in newborns between the ages of 0 to 24 months, as indicated in the current study. After the age of 2 years, the occurrence steadily diminishes. Similar findings have also been reported by Yadav et al[9] and Yohannan et al[10] who also reported an increased male predominance as similar to our findings.

In our study we observed that the common infection among the study participants were respiratory tract infections. Various studies have reported that both viral and bacterial infections are the primary cause for secondary thrombocytosis in children. Currently, respiratory tract infections make up 60-80% of instances of secondary thrombocytosis in children. This is accompanied by infections of the urological and gastrointestinal systems, as well as infections of the bones.[16-18]

In the present study mild thrombocytosis (87.7 %) followed by moderate thrombocytosis (8.9%) and severe thrombocytosis (3.4%). Subramaniam et al[8] had also reported that mild thrombocytosis was the most common observation, similar findings were also reported by Yadav et al9 in their study from New Delhi, India.

Episodes of fever are prevalent among children worldwide. However, they frequently represent underlying pathophysiology that is highly diverse and may have varying prognoses. Fever was a common presenting feature among the study participants, seen in 61.1% of the study population. Children who had a fever in group 1 had thrombocytosis with a greater degree of severity. There is a substantial correlation ($p = 0.02$) between the severity of thrombocytosis and the presence of fever. Thakur et al[19] et al in their study in their study from Nepal, had reported that the increased degree of severity of thrombocytosis was significantly high among children with febrile illness. Similar findings have also been reported by Fouzas et al[21], Matsubara et al[22] and Chiarello et al.[23]

The platelet counts were significantly higher among the patients who had thrombocytosis secondary to infections as compared to the other group. Subramaniam et al[8] had reported similar findings with respect to the platelet counts, while they found that the MPV was significantly higher among children with infections as compared to children without infection. In our study we found no significant variations in the mean platelet volume and Platelet Distribution Width among bot the study groups.

CONCLUSION

Thrombocytosis in the juvenile population is typically a reactive condition, frequently seen in boys who are less than 1 year old. Thromboembolic consequences were not found, even in cases with severe and extensive thrombocytosis. Infections are the primary etiology of secondary thrombocytosis. Among the several platelet indicators, the platelet count was notably elevated in children with infection. There were no notable differences seen in Mean Platelet Volume and Platelet Distribution Width between patients with thrombocytosis and patients with thrombocytosis caused by other factors.

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