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TO KNOW THE FREQUENCY OF DISORDERS RESULTING IN THROMBOCYTOSIS AMONG CHILDREN

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Abstract:

Aim: *The purpose of this study was to determine the frequency of disorders that cause thrombocytosis in children.*

Study Design: *A cross-sectional study.*

Place and Duration: *In the Paediatric Department of DHQ Hospital Rawalpindi in collaboration with Haematology department for One year duration from February 2018 to February 2019.*

Methodology: *300 children of both sexes between the ages of 1 and 16 years were enrolled in the study with platelet counts greater than 500 x 109 / L. A detailed physical examination, history and related tests were performed to determine the cause of increased platelet count.*

Results: *Infections and iron deficiency anaemia were the most common causes of thrombocytosis in children, followed by surgery, trauma, autoimmune diseases, malignancies and burns. One essential thrombocythemia patient was diagnosed in the study.*

Conclusion: *While secondary thrombocytosis is common, primary thrombocytosis is very rare in children. The most common causes of secondary thrombocytosis are iron deficiency anaemia and Infections.*

Key words: *Infections, thrombocytosis, idiopathic thrombocythemia.*

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INTRODUCTION:

Platelets (platelets) are cytoplasmic fragments released from megakaryocytes in the bone marrow. Normal platelet counts range from 150-450 x 103 / µL, and the normal shelf life of platelets is 7-10 days[1-2]. They play an important role in forming a platelet plug at the collagen exposure site, primary haemostasis and for secondary haemostasis providing a suitable atmosphere. Thrombopoietin is a key hormone regulating proliferation and megakaryocyte differentiation, although different cytokines (e.g., Interleukin-6 and 11) may play a supporting role in this process. Platelet counts ≥ 500 x 103 / ≥L are called thrombocytosis[3]. It is divided into light (500 - <700 x 103 / µL), medium (> 700 - 900 x 103 / µL), heavy (> 900 - 1000 x 103 /UL) and excessive (> 1000 x 103 / µL). Thrombocytosis can be divided into primary (necessary) and secondary (reactive). Primary thrombocytosis is rare in childhood and is a myeloproliferative disease caused by polyclonal or monoclonal aberrations of hematopoietic stem cells. Secondary thrombocytosis causes induced megakaryopoiesis due to various haematological or non-haematological diseases and is more common in children[4]. The estimated frequency of reactive thrombocytosis was 3-13% in hospitalized children and 15% in paediatric outpatient clinics. The most common causes of childhood thrombocytosis are infections, tissue damage (surgery, trauma and burns), anaemia, autoimmune diseases and malignancies[5-6]. The frequency of secondary thrombocytosis in childhood shows an age-related structure. The peak occurrence was found in children ≤ 2 years old. Then the incidence of this disorder gradually decreases[7]. Thrombocytosis results vary depending on the aetiology. Primary thrombocytosis is an important cause of thromboembolic or haemorrhagic events in adults and children[8]. Secondary thrombocytosis mostly not cause haemorrhagic or thromboembolic impediments. Though, such complications can occur after a splenectomy or if the primary disease is related with additional thrombosis risk factors[9].

MATERIALS AND METHODS:

This cross-sectional study was held in the Paediatric Department of DHQ Hospital Rawalpindi in collaboration with Haematology department for One year duration from February 2018 to February 2019. 300 children (from 1 day to 16 years) of both sexes were included. Children who were transfused a week before sampling were excluded. Thrombocytosis cases were included to determine the cause. Detailed history, physical examination and research were carried out. Diagnostic criteria for the main known causes of thrombocytosis were determined and patients were appropriately diagnosed. Diagnostic criteria for primary thrombocytosis were: history, physical examination, blood count (CBC), abdominal ultrasound, bone marrow examination and genetic tests, i.e. JAK2 mutation. WHO definitions have been used to diagnose anaemia. The iron deficiency anaemia diagnostic criteria are serum iron, total iron binding capacity (TIBC), and serum ferritin. To confirm haemolytic anaemia, reticulocyte counts, serum lactate dehydrogenase (LDH) and indirect bilirubin were performed. Acute and chronic infections; physical examination, medical history, ESR, CBC, full urinalysis and chest x-ray were done. The diagnostic tool was the culture and sensitivity of some samples. Surgery or injury was diagnosed based on medical history, physical examination and radiological results.

Autoimmune disorders were analysed based on anamnesis, CBC, physical examination, rheumatoid factor, antinuclear antibody, cardiolipin antibody, etc. Malignancy was diagnosed based on anamnesis, abdominal ultrasound (USG), physical examination, MRI or CT scan.

The children were divided into 4 groups by age:

Group I: Day 1 - 1 month
Group II: > 1 month - 2 years
Group III: > 2 years - 10 years
Group IV: > 10 years - 16 years

Thrombocytosis was divided into 4 groups as described above (see above). All data was collected using a performance. Data were analyzed using SPSS 17 software and results are expressed as a percentage.

RESULTS:

A total of 300 children aged 01 to 16 years were assessed during the study, including 190 males and 110 females. The ratio of M: F is 1.72: 1 (Table 1).

TABLE-1: Distribution of study population according to sex (n =300)

Gender	No. of cases	Percentage
Male	190	63.3
Female	110	36.7

Platelet counts ranged from 500 x 103 / µL to 1655 x 103 / µL. The most common type of thrombocytosis was mild (69%), and thrombocytosis occurred in 26.3% of patients. severe thrombocytosis (2.6%) and excessive thrombocytosis (2%).

TABLE-2: Distribution of cases according to severity of Thrombocytosis

Type of Thrombocytosis.	No. of Cases	Percentage
Mild >500 -700 x 10^3/µL	207	69.0
Moderate >700-900 x 10^3/µL	79	26.0
Severe >900-1000 x 10^3/µL	08	03.0
Extreme >1000 x 10^3/µL	06	02.0

The distribution of cases according to different age groups is shown in Table 3.

TABLE-3: Distribution of cases According to Age Groups (n = 300)

Age group	No. of cases.	Percen-tage
Group I Day 1 to 1 month	39	13.0
Group II >1 month to 2 year	178	59.3
Group III >2 years to 10 years	57	19.0
Group IV >10 years to 16 years	26	08.7

The distribution of the study population according to the aetiology of thrombocytosis is shown in Table 4.

TABLE-4: Frequency of Disorders Causing Thrombocytosis in Children

Disorders	No. of Cases	Percen-tage
Acute Infections	118	39.3
Iron deficiency Anaemia	116	38.7
Autoimmune Disease	16	05.3
Surgery, Trauma , Burns	34	11.3
Malignancy	07	02.3
Others	09	03.0

Infections were the most common cause in 118 patients (39.3%). Among infections, the most common respiratory tract infections were 75 (63.5%) followed by gastrointestinal infections 30 (25.4%). Iron deficiency anaemia was the second most common cause of thrombocytosis and was seen in 114 (38%) patients. Injury history included surgery in 12 (4%) patients, surgery in 18 (6%) patients, and burn injuries in 4 (1.33%) patients. Autoimmune diseases were found in 16 (5.3%) children. Among autoimmune diseases, 7 children had systemic lupus erythematosus, 4 had rheumatoid arthritis in children, 2 had Kawasaki disease, 2 had inflammatory bowel disease, and one had a polyamide bump. Malignant neoplasms were observed in 9 patients. Of the malignancies, 7 (2.3%) patients had solid tumours, one had young chronic myelogenous leukaemia, and 1 (0.3%) had primary thrombocythemia.

DISCUSSION:

Thrombocytosis is a common phenomenon in the paediatric population. Responds more often to various stimuli, including systemic infections, inflammation, bleeding, and cancer. This study showed reactive thrombocytosis in 298 (99.3%) cases and primary thrombocytosis only in 2 cases (0.6%) [10-11]. These results were reported by Yadav et al., Who reported primary thrombocytosis in 250 cases. In another study by Subramaniam et al., Only 2 in 1000 children with thrombocytosis had primary thrombocytosis. Thrombocytosis was more common in females (63.3%) than in females (36.6%) [12]. A similar pattern was observed in two other studies, in which 64% and 61.2% of men had thrombocytosis, respectively. Subramaniam et al. He showed that men tended to androgens because they mediated in the number and function of platelets. For us, the role of androgens is lower, because plasma levels of androgens are the same in both sexes up to the age of 6 years, with the highest frequency of thrombocytosis occurring in children up to two years old[13]. More research is needed to examine the causes of high thrombocytosis in male infants. This study shows that most children with thrombocytosis are up to 2 years old (group II). These results are consistent with other studies with the highest frequency of thrombocytosis in children up to 24 months of age. The incidence of neonatal thrombocytosis is probably due to a higher circulating thrombopoietin concentration in foetuses and neonates than in children and adults, and greater sensitivity of new born megakaryocyte progenitor cells to thrombopoietin[14]. The causes of neonatal thrombocytosis were infections (pneumonia and infectious diarrhoea), anaemia (autoimmune haemolytic anaemia and iron deficiency anaemia) and prematurity. Iron deficiency was the cause of

thrombocytosis in 114 cases (38.6%). Iron deficiency is the most common nutritional deficiency in the world and is a major cause of reactive thrombocytosis, even without inflammation and bleeding. Erythropoietin levels increase iron deficiency anaemia and play a synergistic role with thrombopoietin in stimulating platelet production. Tissue damage (surgery, trauma, burns) was associated with thrombocytosis in 11.3% of cases[15]. These results are similar to other studies that cause an increased platelet count in 15% of children with tissue damage. Trauma and surgery are associated with increased thrombocytosis and an increase in thrombopoietin levels. Malignant neoplasms were diagnosed in 9 (3%) cases. Seven had solid tumours, one had young chronic myelogenous leukaemia, and one had primary thrombocytemia. Solid tumour thrombocytosis has been extensively studied and the prognosis has been poor.

CONCLUSION:

Secondary thrombocytosis is common and primary thrombocytosis is rare among children. The main causes of secondary thrombocytosis are infections, anaemia, autoimmune diseases, trauma and malignant tumours.

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