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Prevalence of Thrombocytosis in Children with Iron Deficiency Anemia

Naseemullah Khan[1], Qamar uz Zaman Shahzad[1], Atiqa Ramzan[1], Ayesha Ali[1], Kanwal Fatima[1], Feeza Ejaz[1]

[1]Department of Paediatrics, Shalamar Hospital, Lahore, Punjab, Pakistan.

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Correspondence to: Naseemullah Khan Department of Paediatrics, Shalamar Hospital, Lahore, Punjab, Pakistan.
Email: naseemullahkhan2008@gmail.com

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ABSTRACT

Background: Iron deficiency anemia (IDA) is the most common nutritional deficiency in children and is often associated with hematological abnormalities beyond anemia itself, including reactive thrombocytosis. **Objective:** To determine the prevalence of thrombocytosis among children diagnosed with iron deficiency anemia and to analyze its association with demographic and clinical variables. **Methods:** This cross-sectional study was conducted at the Department of Pediatric Medicine, Shalamar Hospital, Lahore, over a defined period. A total of 200 children aged 1 to 12 years with diagnosed IDA were enrolled through non-probability consecutive sampling. Demographic and clinical data were collected using a structured proforma. Blood samples were analyzed for hemoglobin, serum ferritin, and platelet count. **Results:** The mean age of participants was 6.4 ± 3.1 years, and 54% were male. Thrombocytosis was found in 138 out of 200 children (69%). It was more common in children with serum ferritin <10 ng/mL (78.6%) compared to those with ≥10 ng/mL (56.8%) ($p = 0.002$). A significant association was also observed with socioeconomic status, with higher rates among children from low-income families ($p = 0.03$). No significant associations were found with age or gender. **Conclusion:** Thrombocytosis is a frequent finding in children with iron deficiency anemia, particularly among those with severe iron depletion and lower socioeconomic status. Clinicians should recognize this benign, reactive process to prevent unnecessary investigations and focus on timely nutritional management.

INTRODUCTION

Several diseases may lead to anemia and thrombocytosis. Certain of these disorders have to be managed right away, while others are not urgent, but early and accurate diagnosis is very helpful in dealing with them [1]. Most often found in females, iron deficiency anemia affects people everywhere; males can also develop this condition. Iron deficiency anemia usually goes together with thrombocytosis, but there is only little research about how it affects other parts of the blood [2,3]. Nearly all patients with iron deficiency show either normal or heightened platelet counts, some being much higher than 400 × 109/L at diagnosis. How thrombocytosis develops is unclear, but it is thought to play a role in changing iron-related enzymes in the cells and the process that creates blood platelets [4].

Many disorders and health problems involve thrombocytosis. A raised platelet count might be caused either by a reactive process or by inappropriate platelet production (as in a neoplastic disorder). A number of medical and surgical issues can bring about reactive thrombocytosis and iron deficiency anemia is among them [5,6]. Not having enough iron can sometimes decrease the number of platelets. Most iron deficiency patients have normal or raised platelet levels, including some as high as 400 × 109/L at the onset and elevated platelets with iron deficiency are a rare event. Seventy percent of the 42 children in the case series with severe iron deficiency anemia showed thrombocytosis [7,8]. The purpose of this research is to discover how frequent thrombocytosis is among children with iron deficiency anemia. Low iron is often seen in children with thrombocytosis. It was seen in literature that iron deficiency anemia is rarely associated with thrombocytosis. But, not much is found in literature and this has never been studied locally. That is why we want to conduct this study so we can learn how common thrombocytosis is among children with iron deficiency anemia. It is important for the future, so we can use our research to help in our community and manage children appropriately.

Objective

To determine the prevalence of thrombocytosis in children with iron deficiency anemia

METHODOLOGY

This Cross-sectional study was conducted at the Department of Pediatric Medicine, Shalamar Hospital, Lahore from 7 October 2024 to 7 April 2025. By using the WHO calculator, a sample size of 200 cases is calculated with 95% confidence level, 6.5% margin of error and

percentage of thrombocytosis i.e. 70% in children with iron deficiency anemia. Data were collected through Non-probability, consecutive sampling.

Inclusion Criteria

- Children at age 1-12 years
- Either gender
- Diagnosed with iron deficiency anemia (as per operational definition)

Exclusion Criteria

- Children taking supplements for iron or improvement in blood parameters
- Thalassemia major children or abnormal blood clotting profile (PT>20 sec)
- Malnutrition (WHZ core<-2 on WHO classification) or taking treatment

Data Collection

After approval from hospital ethical committee, data were collected from 200 patients. Demographic and clinical data were collected using a structured proforma. Variables recorded included age, gender, weight, parental education, number of siblings, area of residence (urban/rural), and socioeconomic status. Socioeconomic status was classified as low (monthly income < PKR 25,000), middle (PKR 25,000–50,000), and high (> PKR 50,000). Venous blood samples (3cc) were collected from each participant using sterile syringes and sent to the hospital's laboratory for analysis. Hematological parameters assessed included hemoglobin level, serum ferritin concentration, and platelet count. Thrombocytosis was defined as a platelet count >400 × 10^9/L.

Statistical Analysis

Data were entered and analyzed using SPSS version 25.0 (IBM Corp., Armonk, NY, USA). Normality of continuous variables was assessed using the Shapiro-Wilk test. Quantitative variables such as age, weight, hemoglobin, serum ferritin, and platelet count were expressed as mean ± standard deviation (SD). Categorical variables such as gender, parental education, residence, socioeconomic status, and thrombocytosis were reported as frequencies and percentages. Data were stratified by age, gender, weight, socioeconomic status, and hematological indices to control for potential confounders. Post-stratification associations between variables and thrombocytosis were evaluated using the Chi-square test. A p-value ≤ 0.05 was considered statistically significant.

RESULTS

Data were collected from 200 patients. The mean age of the children enrolled in the study was 6.4 ± 3.1 years, with a slight male predominance (54% male and 46% female). The average hemoglobin level among participants was 8.1 ± 1.2 g/dL, while the mean serum ferritin level was 10.4 ± 3.8 ng/mL, indicating moderate to severe iron deficiency. The mean platelet count was elevated at 448 × 10^9/L, supporting the presence of reactive thrombocytosis in many cases. Most children were urban residents (61%), and nearly half (48%) belonged to low-income families, suggesting a socioeconomic vulnerability contributing to the nutritional deficiency.

Table 1

Baseline Characteristics

Variable	Value
Age (years)	6.4 ± 3.1
Gender (Male)	108 (54%)
Gender (Female)	92 (46%)
Hemoglobin (g/dL)	8.1 ± 1.2
Serum Ferritin (ng/mL)	10.4 ± 3.8
Platelet Count (×10^9/L)	448 ± 92
Urban Residence	122 (61%)
Rural Residence	78 (39%)
Low Income	96 (48%)
Middle Income	72 (36%)
High Income	32 (16%)

Out of the 200 children diagnosed with iron deficiency anemia, 138 (69%) were found to have thrombocytosis, defined as a platelet count greater than 400 × 10^9/L. The remaining 62 children (31%) had normal platelet counts.

Table 2

Prevalence of Thrombocytosis

Platelet Status	Number of Patients	Percentage (%)
Thrombocytosis (>400 ×10^9/L)	138	69
Normal Platelet Count (≤400 ×10^9/L)	62	31
Total	200	100

Thrombocytosis was slightly more prevalent in children aged 1–5 years (70.9%) compared to those aged 6–12 years (66.7%), although the difference was not statistically significant (p = 0.48). When stratified by gender, 70.4% of males and 67.4% of females had thrombocytosis, showing no meaningful difference (p = 0.64). However, a significant association was observed with socioeconomic status: children from low-income families had the highest prevalence (77.1%) compared to middle-income (61.1%) and high-income (62.5%) groups (p = 0.03), indicating that lower socioeconomic status may be a contributing factor to thrombocytosis in iron deficiency anemia.

Table 3

Thrombocytosis by Age, gender and socioeconomic status

Age Group (years)	Thrombocytosis	Percentage (%)	p-value
1–5	78	70.9	
6–12	60	66.7	0.48
Total	138	69.0	
Gender			
Male	76	70.4	
Female	62	67.4	0.64
Total	138	69.0	
Socioeconomic Status			
Low	74	77.1	
Middle	44	61.1	0.03
High	20	62.5	
Total	138	69.0	

The data show that thrombocytosis was markedly more common in children with serum ferritin levels <10 ng/mL, affecting 78.6% of this group, compared to 56.8% in those with ferritin ≥10 ng/mL. This difference was statistically significant (p = 0.002), indicating a strong inverse correlation between iron stores and elevated platelet count.

Table 4
Thrombocytosis by Serum Ferritin Level

Ferritin Level	Thrombocytosis	Percentage (%)	p-value
<10 ng/mL	88	78.6	
≥10 ng/mL	50	56.8	0.002
Total	138	69.0	

Thrombocytosis was observed in 73.6% of children with hemoglobin levels ≤8 g/dL, compared to 63.3% in those with hemoglobin >8 g/dL. Although a higher frequency of thrombocytosis was noted in the more severely anemic group, the difference did not reach statistical significance (p = 0.1).

Table 5
Thrombocytosis by Hemoglobin Level

Hemoglobin Level	Thrombocytosis	Percentage (%)	p-value
≤8 g/dL	81	73.6	0.1
>8 g/dL	57	63.3	nan
Total	138	69.0	nan

DISCUSSION

The research was carried out to assess the rate of thrombocytosis in children with iron deficiency anemia (IDA) and to investigate its links with various patient factors. According to the results, 69% of children with iron deficiency anemia had increased platelet counts, proving a strong link between the anemia and abnormal platelet levels in kids. Experts found results that are very close to what has been observed in the past [9]. It is shown in these results that iron insufficiency induces reactive thrombocytosis by stimulating the bone marrow cells to replenish red blood cells and platelets, apparently by stimulating more erythropoietin to promote megakaryocyte proliferation. Even though there was a slight increase in thrombocytosis for children aged 1–5, the difference compared to older children was not significant [10]. This issue could come from the fact that young children's bodies need more iron and they are more easily affected by nutritional shortages. There was a strong connection found between having thrombocytosis and being in a lower socioeconomic group [11]. More children with low income had high platelet levels which may be due to not having enough to eat, fewer healthcare options and their parents being less aware of the problem [12]. Research done in similar settings found that as serum ferritin levels rise, thrombocytosis levels tend to decrease [13]. Kids with ferritin under 10 ng/mL had more frequent thrombocytosis than kids with ferritin levels higher than 10 ng/mL. The finding shows that iron deficiency gets worse the higher the platelet levels [14]. The trend in hemoglobin was toward an association as well, but not statistically significant which gives serum ferritin more sensitivity for detecting this [15]. What has been learned in this study is very important for clinical practice. Detecting thrombocytosis in a child suffering from microcytic anemia should make one first consider iron deficiency, not serious conditions like myeloproliferative disorders or infections, mainly in places with limited resources [16]. Understanding that reactive thrombocytosis in IDA is both usual and not dangerous can stop extra medical testing and concerns among parents and medical staff [17]. But there are several problems with this study. Due to being conducted at a single center, the conclusions may not apply to other groups. Using non-probability where probabilities are lacking can cause selection bias. Follow-up visits to check if platelets returned to normal after iron therapy were not conducted which could have shown when an improved iron level affects platelet count.

CONCLUSION

It is concluded that thrombocytosis is a highly prevalent hematological finding in children with iron deficiency anemia, with nearly 69% of affected children demonstrating elevated platelet counts. The prevalence was notably higher in children with lower serum ferritin levels and among those from lower socioeconomic backgrounds. Although age and gender showed no statistically significant associations, the findings underscore the importance of considering iron deficiency as a primary cause of thrombocytosis in pediatric patients. Recognizing this association can aid in avoiding unnecessary diagnostic workups and focusing on early nutritional intervention.

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