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Decoding & Exploring the Distribution and Etiology of Thrombocytosis in a Tertiary Care Setting

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Abstract

Background: *Thrombocytosis, defined as a platelet count above 4.5×10^5 cells/μL, is frequently detected as an incidental finding in routine hematological assessments. Such discoveries can precipitate unnecessary investigations and specialist referrals, generating avoidable clinical concern.*

Aim: *To examine the occurrence, distribution, and underlying etiologies of thrombocytosis among adult patients with varied clinical presentations.*

Methods: *A cross-sectional observational study was conducted at Saveetha Medical College and Hospital from January to March 2024. Adult patients exhibiting platelet counts beyond the diagnostic threshold were enrolled. Demographic details, clinical diagnoses, platelet counts, total leukocyte count (TLC), absolute neutrophil count, neutrophil–lymphocyte ratio (NLR), hemoglobin concentration, and C-reactive protein (CRP) levels were documented in a structured database. Statistical correlations were analyzed using Pearson's coefficient in SPSS version 26.0.*

Results: *Of 100 patients evaluated (platelet range: 450×10^3 to 850×10^3 cells/μL), 2.0% were diagnosed with primary thrombocytosis, while 98.0% exhibited reactive causes. Significant associations were observed with absolute neutrophil count ($p = 0.013$) and NLR ($p = 0.029$).*

Conclusion: *Elevated platelet counts carry clinical significance that extends beyond a laboratory anomaly, reflecting diverse pathological processes. Secondary thrombocytosis remains the predominant form and should be excluded prior to exploring primary etiologies. Judicious interpretation with careful clinical correlation is essential to prevent misdirected diagnostic efforts.*

Keywords: *Thrombocytosis, Platelet count, Reactive thrombocytosis, Essential thrombocythemia, Myeloproliferative neoplasm,*

INTRODUCTION

A persistently elevated platelet concentration in peripheral blood-exceeding 450×10^3/μL-defines the hematological entity termed thrombocytosis explained in Figure 1. Thrombocytes, beyond their canonical role in primary hemostasis, also participate in inflammatory cascades and vascular repair. When present in excess, however, these cells can become pathogenic, predisposing individuals to thrombotic events and, in rarer instances, paradoxical hemorrhages [1]. Such complications, including myocardial infarctions and cerebrovascular accidents, may arise without preceding clinical warning. Baseline platelet ranges are not universal; they fluctuate according to demographic attributes such as age and sex, and may also vary with geographical or environmental context [2].

The advent of automated hematology analyzers has incorporated platelet enumeration into the routine complete blood count (CBC), thereby increasing incidental identification of thrombocytosis. For primary care practitioners, these incidental findings often present interpretive challenges. Etiological classification recognizes three categories: pseudothrombocytosis (spurious), primary (clonal), and secondary/reactive forms. Primary thrombocytosis, frequently linked to myeloproliferative neoplasms (MPNs), is notable for its potential to remain clinically silent until overt thrombotic or hemorrhagic manifestations develop. It exhibits a stronger association with vascular events than reactive thrombocytosis, and its diagnosis mandates the prior exclusion of secondary causes, which are often transient in nature [3].

Reactive thrombocytosis, although generally less directly thrombogenic, assumes clinical importance when compounded by comorbid states that enhance coagulopathic risk. It can serve as a hematological biomarker of persistent infection, occult malignancy, or systemic inflammatory processes. Beyond its diagnostic value, thrombocytosis has been documented as an independent prognostic factor, with

correlations to adverse outcomes, including mortality, across varied clinical settings [4]. Moreover, it has been implicated in the pathogenesis or progression of specific complications such as diabetic retinopathy, invasive fungal disease, intraventricular hemorrhage, myocardial infarction, and post-splenectomy thromboembolic syndromes [5].

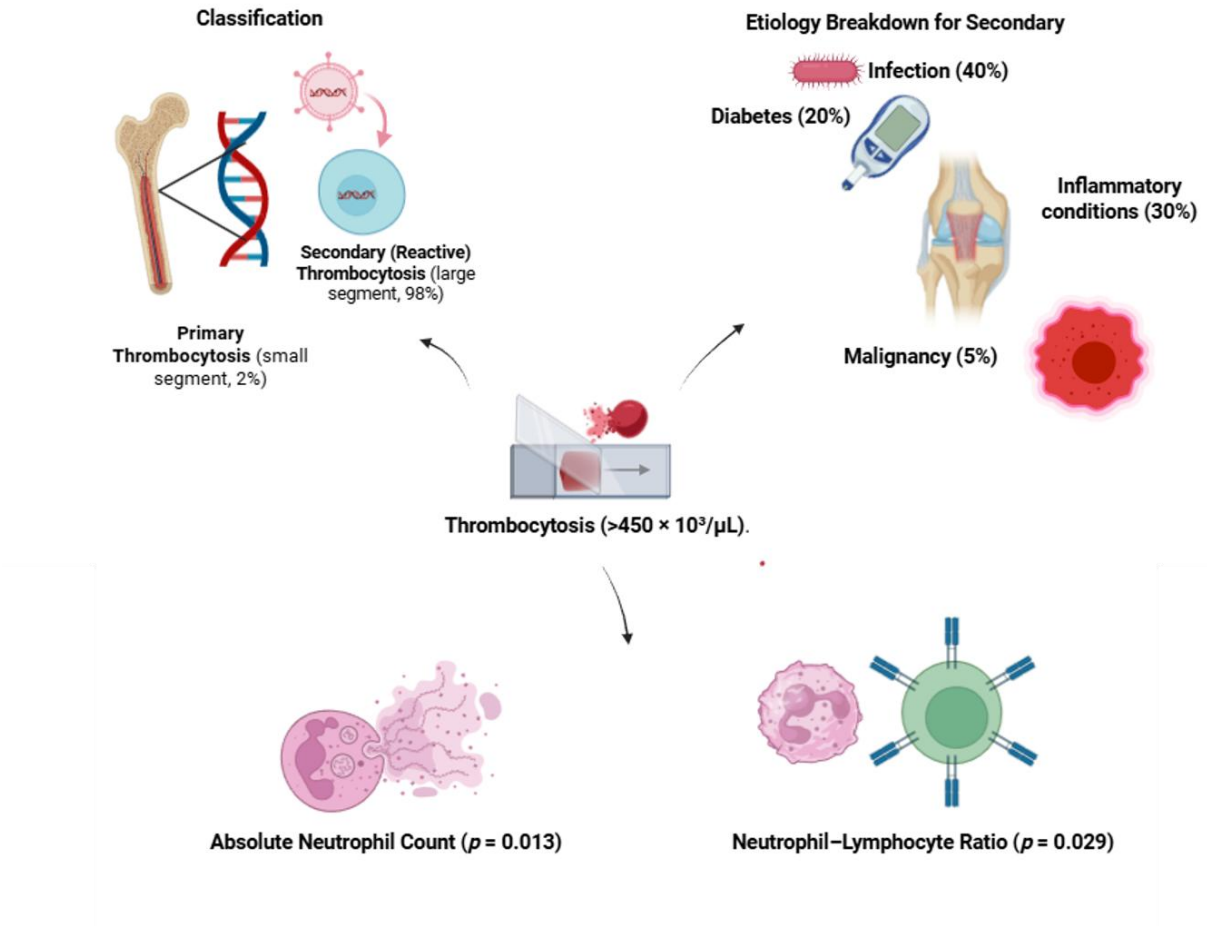


Figure 1: Classification, etiological distribution, and associated laboratory parameters in adult thrombocytosis

The unanticipated detection of elevated platelet counts can generate significant clinical apprehension, sometimes prompting excessive referrals and redundant testing. Limited awareness among frontline physicians about the prognostic and diagnostic significance of thrombocytosis may result in both over-investigation and under-recognition of clinically important cases [6]. While the phenomenon has been well-characterized in global literature, there remains a paucity of region-specific research from the Indian subcontinent, highlighting a gap that warrants targeted investigation [7].

MATERIALS AND METHODS

A cross-sectional, observational design was adopted for the present investigation, conducted at Saveetha Medical College and Hospital over a three-month interval (January–March 2024). Hematological profiling was performed on a SYSMEX XN-1000 fully automated six-part differential analyzer, with multiple hematological parameters assessed concurrently [8].

Eligible participants were adult inpatients (≥18 years) exhibiting platelet concentrations exceeding 450 × 10^3 cells/µL. Exactly one hundred cases meeting these inclusion criteria were enrolled. Clinical and laboratory variables were extracted from hospital records and compiled into a structured Microsoft Excel dataset. Recorded parameters included demographic attributes (age, sex), provisional or definitive clinical diagnosis, platelet count, total leukocyte count (TLC), absolute neutrophil count, neutrophil-to-lymphocyte ratio (NLR), hemoglobin concentration, and C-reactive protein (CRP) levels [9].

Platelet counts in the reference range of 150 × 10^3–450 × 10^3 cells/µL, TLC values between 4 × 10^3–11 × 10^3 cells/µL, hemoglobin levels of 12–16 g/dL, and CRP concentrations below 0.6 mg/L were

considered physiologically normal for comparative interpretation. Statistical associations between thrombocytosis and other hematological variables were examined using Pearson's correlation coefficient, computed in IBM SPSS Statistics version 26.0.

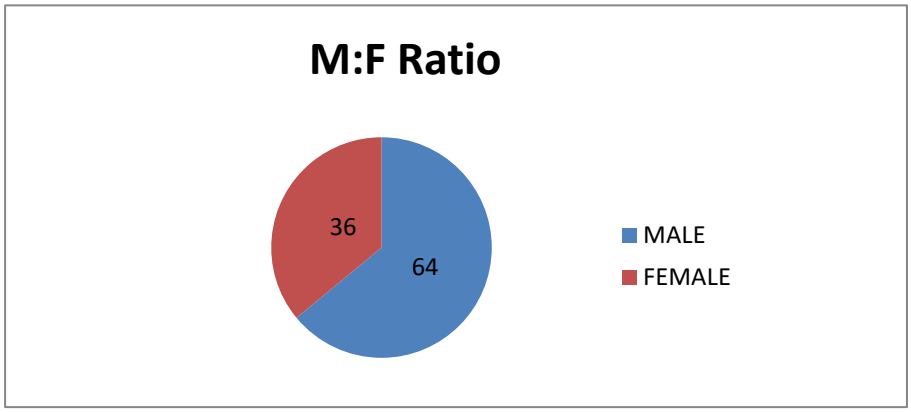
Classification into primary and secondary thrombocytosis was based on an integrated assessment of clinical context, bone marrow cytomorphology, and molecular diagnostic findings. According to the World Health Organization (WHO) criteria, essential thrombocythemia is diagnosed when the platelet count exceeds 450 × 10^3 cells/μL in the presence of a clonal driver mutation in JAK2, CALR, or MPL, with exclusion of reactive or secondary causes. Reactive thrombocytosis was defined as an elevated platelet count attributable to another pathological process, such as infection, inflammation, or neoplasia [10].

RESULTS

Statistical evaluation was performed to assess the relationships between hematological and clinical variables with the occurrence of thrombocytosis, defined as a platelet count above 450 × 10^3/μL. Both univariate and multivariate analyses were undertaken using Pearson's correlation in SPSS Statistics version 26.0, with statistical significance set at $p < 0.05$.

Etiological Profile

From the Figure 2Among the 100 cases studied, reactive (secondary) causes predominated: infections (40%), diabetes mellitus (20%), inflammatory disorders (18%), myocardial infarction (6%), malignancy (5%), abnormal uterine bleeding (5%), and cerebrovascular accidents (4%). Only two patients were diagnosed with primary thrombocytosis-one with essential thrombocythemia and one with polycythemia Vera.



Aetiology	Number of Cases (n)	Percentage (%)
Infections	40	40%
Diabetes	20	20%
Inflammatory	18	18%
Myocardial Infarction (MI)	6	6%
Malignancy	5	5%
Abnormal Uterine Bleeding (AUB)	5	5%
Cerebrovascular Accident (CVA)	4	4%
Essential Thrombocytosis	1	1%
Polycythemia Vera	1	1%

Figure 2. Gender distribution of thrombocytosis cases. Pie chart showing male-to-female ratio among the 100 patients studied, with males constituting 64% and females 36% of the cohort.

Table 1. Etiological distribution of thrombocytosis in 100 patients, showing predominance of secondary causes, particularly infections (40%), diabetes (20%), and inflammatory disorders (18%), with only 2% having primary thrombocytosis.

Hematological Parameters

Figure represent the Mean platelet concentration was 527,330 cells/μL (range: 450,000–850,000), mean TLC was 10,390 cells/μL (range: 2,200–48,623), mean absolute neutrophil count was 8,224 cells/μL (range: 794–42,031), mean NLR was 10.14 (range: 1.06–16.8), mean hemoglobin was 12.2 g/dL (range: 6.1–16.8), and mean CRP level was 6.0 mg/L (range: 4–532). Significant correlations were identified between thrombocytosis and both the absolute neutrophil count ($p = 0.013$) and NLR ($p = 0.029$).

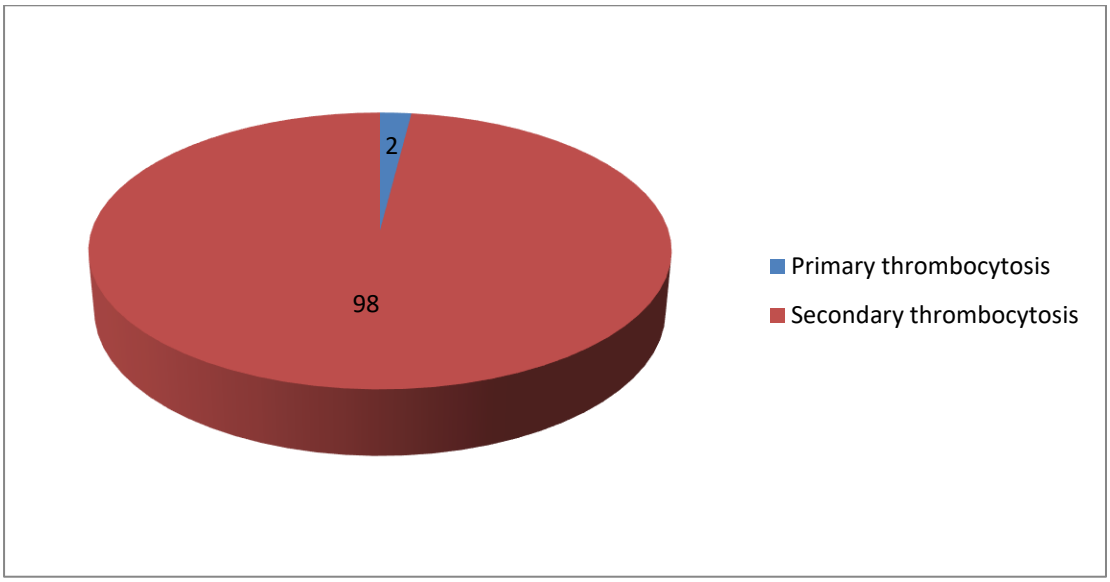


Figure 3. Distribution of primary (2%) and secondary (98%) thrombocytosis among study participants, with secondary causes showing significant correlations with absolute neutrophil count and neutrophil–lymphocyte ratio.

Parameter	Mean Value	Range
Platelet cells/CUMM	527,330	450,000–850,000
TLC cells/CUMM	10,390	2,200–48,623
Neutrophils cells/CUMM	8,224	794–42,031
NLR	10.14	1.06–16.8
Hemoglobin g/dL	12.2	6.1–16.8
CRP mg/L	6.0	4–532

Table 2. Mean values and ranges of key hematological parameters in thrombocytosis patients, highlighting elevated platelet counts and inflammatory markers.

DISCUSSION

Platelets function as acute-phase reactants, with production amplified in response to diverse physiological and pathological stimuli, including systemic infection, inflammation, malignancy, and hemorrhage. This response is mediated via increased levels of thrombopoietinx, interleukin-6, and other pro-inflammatory cytokines, as well as catecholamines. In the present cohort, the predominance of secondary thrombocytosis aligns with prior work [11].

Notably, 5% of the cohort had concomitant malignancy-two with carcinoma of the stomach, two with carcinoma of the cervix, and one with buccal mucosal carcinoma. Previous reports have documented thrombocytosis in up to 50% of ovarian carcinoma cases, while Bailey S.E. et al. have described associations with gastrointestinal, pulmonary, and ovarian malignancies [12].

Primary thrombocytosis represents a clonal myeloproliferative disorder, often driven by mutations in JAK2, CALR, or MPL, resulting in autonomous megakaryocytic proliferation. Reactive thrombocytosis, in contrast, is typically cytokine-mediated and reversible upon resolution of the underlying condition. Differentiation between these entities is essential, as therapeutic approaches differ markedly-primary cases may require cytoreductive agents (e.g., hydroxyurea, anagrelide) and antiplatelet prophylaxis, whereas reactive cases necessitate targeted management of the precipitating cause[13 -15].

CONCLUSION

This study reinforces that, in adult populations, secondary thrombocytosis is considerably more prevalent than its primary counterpart. Infections, inflammatory processes, and metabolic disorders such as diabetes mellitus constitute the most frequent triggers. While often transient, reactive thrombocytosis warrants careful evaluation to identify and address underlying pathology. In the absence of a reversible cause, persistent thrombocytosis should prompt investigation for a myeloproliferative neoplasm. Accurate classification, informed by clinical, morphological, and molecular data, remains central to optimizing patient management and reducing the risk of thrombotic and hemorrhagic complications.

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