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Clinical Profile and Maternal–Neonatal Outcomes of Thrombocytopenia in Pregnancy: A Prospective Observational Study

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Abstract

Background: Thrombocytopenia is a common hematological abnormality encountered during pregnancy and may range from a benign physiological finding to a manifestation of severe maternal disease with significant fetomaternal implications.

Objectives: To evaluate the clinical profile, etiological spectrum, severity, and associated maternal and neonatal outcomes of thrombocytopenia in pregnancy.

Methods: This prospective observational study was conducted over 24 months at a tertiary care center and included 350 pregnant women with platelet counts <150 × 10⁹/L. Maternal demographics, severity and etiology of thrombocytopenia, and maternal and neonatal outcomes were analyzed.

Results: Mild thrombocytopenia was observed in 61.1% of women, moderate in 29.1%, and severe in 9.8%. Gestational thrombocytopenia was the most common etiology (60%), followed by hypertensive disorders of pregnancy (21.1%) and immune thrombocytopenic purpura (10.9%). Postpartum hemorrhage occurred in 14.9% of cases, and 19.4% required platelet transfusion. Severe thrombocytopenia was significantly associated with increased rates of postpartum hemorrhage, intensive care unit admission, and transfusion ($p < 0.001$). Adverse neonatal outcomes included preterm birth (24%), low birth weight (33.7%), neonatal intensive care unit admission (20.6%), neonatal thrombocytopenia (8%), and perinatal mortality (4%).

Conclusion: Thrombocytopenia in pregnancy is a heterogeneous condition. While mild gestational thrombocytopenia is largely benign, moderate to severe thrombocytopenia—particularly when associated with hypertensive disorders or immune thrombocytopenic purpura—is associated with significant maternal and neonatal morbidity.

Keywords: Thrombocytopenia, Pregnancy, Gestational thrombocytopenia, HELLP syndrome, Immune thrombocytopenic purpura, Maternal outcomes, Neonatal outcomes.

Introduction

Thrombocytopenia, defined as a platelet count below 150,000/µL, is one of the most common hematological abnormalities encountered during pregnancy, second only to anemia. It affects approximately 7–10% of pregnancies, depending on the population studied and diagnostic thresholds used [1–3]. Although often incidental, thrombocytopenia in pregnancy can range from a benign physiological finding to a marker of severe maternal disease with significant fetomaternal

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implications. The most frequent cause of thrombocytopenia in pregnancy is gestational thrombocytopenia, accounting for nearly 60–70% of cases [3,4]. This condition is typically mild, detected in the late second or third trimester, and not associated with adverse maternal or neonatal outcomes. In contrast, pathological causes such as hypertensive disorders of pregnancy (including preeclampsia and HELLP syndrome) and immune thrombocytopenic purpura (ITP) are less common but clinically significant, often presenting with moderate to severe thrombocytopenia and increased risk of hemorrhagic complications [4–6].

Hypertensive disorders contribute substantially to pregnancy-associated thrombocytopenia, where declining platelet counts often reflect disease severity rather than isolated hematological dysfunction [6,7]. Similarly, ITP, though relatively uncommon, poses challenges in management due to potential maternal bleeding and the risk of neonatal thrombocytopenia secondary to transplacental transfer of antiplatelet antibodies [8,9]. Thrombocytopenia in pregnancy has been associated with adverse outcomes such as postpartum hemorrhage, increased transfusion requirements, preterm birth, low birth weight, and neonatal intensive care unit admission, particularly in cases of severe thrombocytopenia or underlying systemic disease [10–12]. Early identification of thrombocytopenia, accurate etiological classification, and timely multidisciplinary intervention are therefore essential to optimize maternal and neonatal outcomes. Despite its clinical relevance, there remains variability in reported prevalence, etiological distribution, and outcome associations across different populations, especially in low- and middle-income countries. This prospective observational study was undertaken to evaluate the clinical profile, severity, etiological spectrum, and maternal–neonatal outcomes of thrombocytopenia in pregnancy at a tertiary care center.

Study Objectives

Primary Objective

- To evaluate **maternal and neonatal outcomes** in pregnancies complicated by thrombocytopenia.

Secondary Objectives

1. To describe the **clinical and etiological profile** of thrombocytopenia in pregnancy.
2. To assess the relationship between **severity of thrombocytopenia** and adverse maternal outcomes.
3. To determine the incidence and predictors of **neonatal thrombocytopenia**.

To evaluate the association between thrombocytopenia and **postpartum hemorrhage (PPH)**.

Methodology

Study Design

- Prospective observational study

Study Setting

- Single tertiary care center (Department of Obstetrics & Gynecology)

Study Duration

- 24 months

Sample Size

- 350 pregnant women

Study Population

Inclusion Criteria

- Pregnant women at any gestational age
- Platelet count <150 ×10⁹/L
- Singleton pregnancy
- Willing to provide informed consent

Exclusion Criteria

- Known haematological malignancies
- Chronic liver disease or splenomegaly
- Use of anticoagulants

Pre-existing bone marrow disorders

Results

A total of **350 pregnant women with thrombocytopenia** were included in the study

The majority of women were in the **25–30-year age group**, and **multigravidae constituted 57.7%** of the study population, while **42.3% were primigravidae**. Most women were **booked cases (81.7%)**, indicating adequate antenatal care. Thrombocytopenia was predominantly detected during the **third trimester**, reflecting routine antenatal surveillance and disease progression in later gestation (Table 1).

Based on platelet count at diagnosis, **mild thrombocytopenia (100,000–150,000/µL)** was the most common presentation, observed in **214 women (61.1%)**. **Moderate thrombocytopenia (50,000–99,999/µL)** was noted

Table 1: Baseline demographic and obstetric characteristics (n=350)

Variable	n	%
Primigravida	148	42.3
Multigravida	202	57.7
Booked	286	81.7
Unbooked	64	18.3

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Table 2: Severity of thrombocytopenia

Severity	Platelet count (/µL)	n	%
Mild	100,000–150,000	214	61.1
Moderate	50,000–99,999	102	29.1
Severe	<50,000	34	9.8

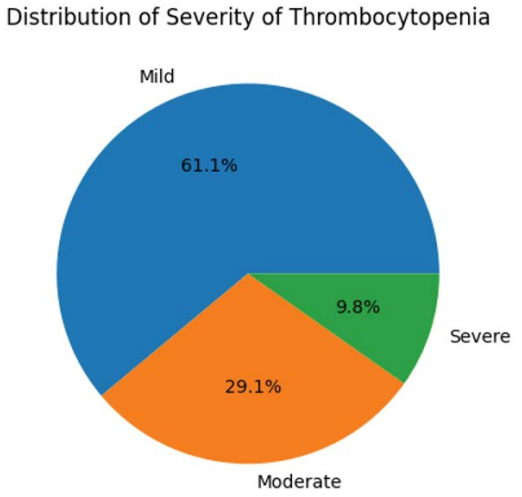

Figure 1: Distribution of Severity of Thrombocytopenia

in **102 women (29.1%)**, while **severe thrombocytopenia (<50,000/µL)** was seen in **34 women (9.8%)** (Table 2, Figure 1).

Gestational thrombocytopenia was the predominant etiology, accounting for **60.0% (n=210)** of cases. Hypertensive disorders of pregnancy, including **preeclampsia and HELLP syndrome**, constituted **21.1% (n=74)**. **Immune thrombocytopenic purpura (ITP)** was identified in **10.9% (n=38)**, while other causes such as viral infections, sepsis, and acute fatty liver of pregnancy accounted for **8.0% (n=28)** (Table 3, Figure 2).

Maternal complications were observed more frequently with increasing severity of thrombocytopenia. **Postpartum hemorrhage (PPH)** occurred in **52 women (14.9%)**, and **19.4% (n=68)** required **platelet transfusion**. **ICU admission** was necessary in **7.4% (n=26)** cases. **Maternal mortality** was reported in **2 cases (0.6%)**, both associated with severe thrombocytopenia and underlying hypertensive disorders (Table 4, Figure 3).

Table 3: Etiology of thrombocytopenia

Etiology	n	%
Gestational	210	60
Preeclampsia/HELLP	74	21.1
ITP	38	10.9
Others	28	8

Adverse neonatal outcomes were common. **Preterm birth (<37 weeks)** occurred in **24.0% (n=84)** of neonates, while **low birth weight (<2.5 kg)** was observed in **33.7% (n=118)**. **NICU admission** was required for **20.6% (n=72)** neonates. **Neonatal thrombocytopenia** was detected in **8.0% (n=28)**, and **perinatal mortality** was noted in **4.0% (n=14)** cases (Table 5, Figure 4).

A significant association was observed between the **severity of thrombocytopenia and maternal complications**. The incidence of **PPH increased from 6.1% in mild cases to 47.1% in severe thrombocytopenia**. Similarly, **ICU admission** and **platelet transfusion requirements** rose markedly with severity, reaching **29.4% and 82.3%**, respectively, in the severe group. This association was **statistically significant ($p < 0.001$)** (Table 6, Figure 5).

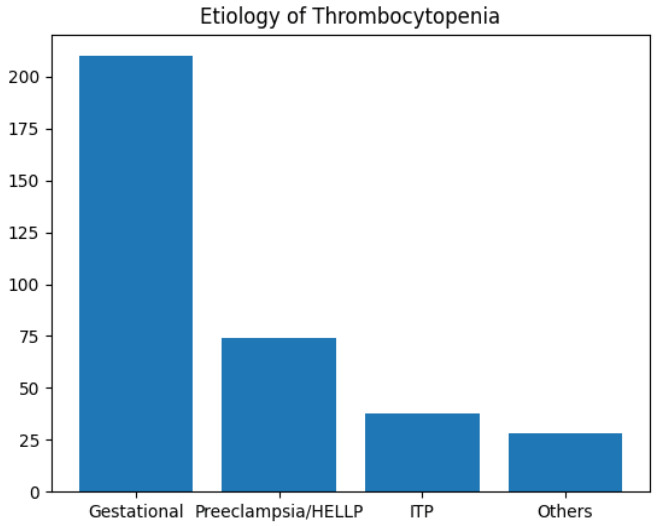

Figure 2: Etiology of Thrombocytopenia

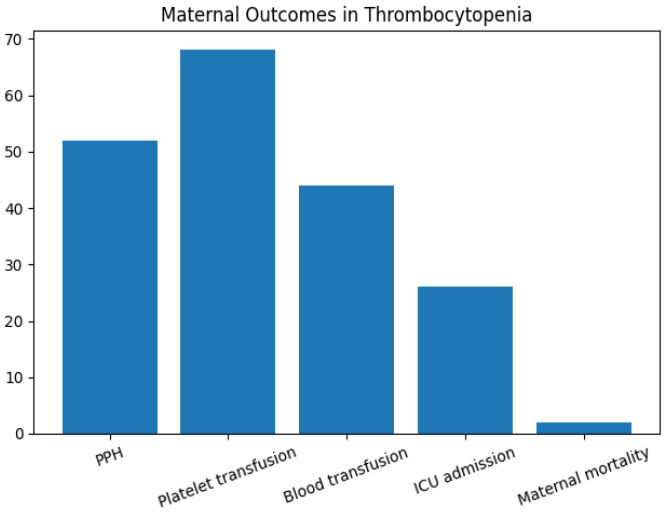

Figure 3: Maternal Outcomes

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Table 4: Maternal outcomes

Outcome	n	%
PPH	52	14.9
Platelet transfusion	68	19.4
ICU admission	26	7.4
Maternal mortality	2	0.6

Table 5: Neonatal outcomes

Outcome	n	%
Preterm birth	84	24
Low birth weight	118	33.7
NICU admission	72	20.6
Perinatal mortality	14	4

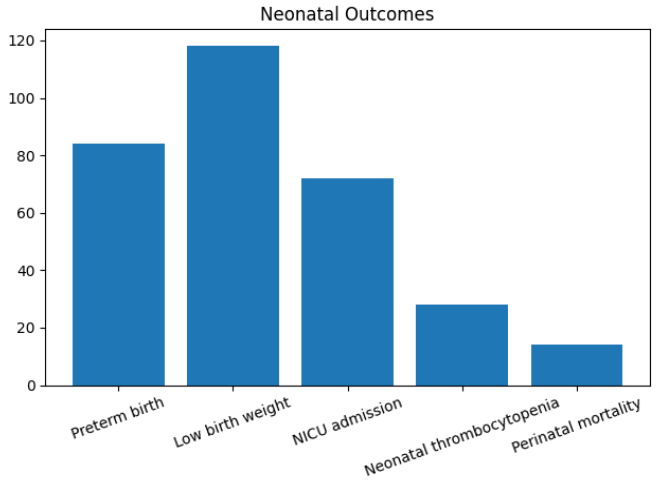

Figure 4: Neonatal Outcomes

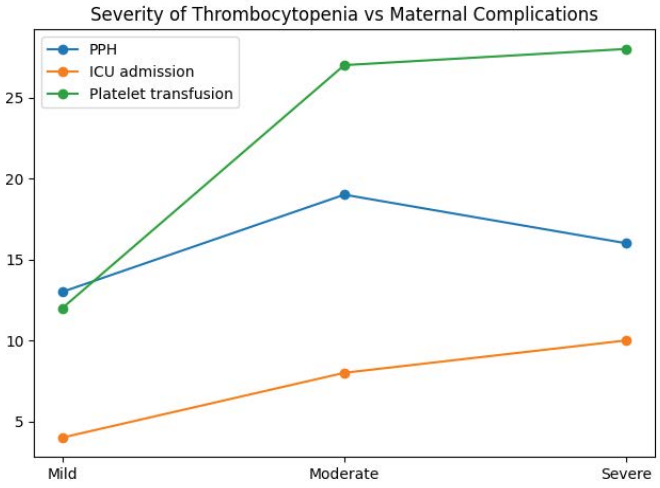

Figure 5: Severity vs Maternal Complications

Table 6: Association between severity and maternal complications

Severity	PPH %	ICU %	Transfusion %
Mild	6.1	1.9	5.6
Moderate	18.6	7.8	26.5
Severe	47.1	29.4	82.3

Discussion

Thrombocytopenia is a common hematological abnormality in pregnancy, with reported prevalence ranging from **7–10%** in antenatal populations [1,2]. In the present prospective study of 350 women, **mild thrombocytopenia constituted the majority (61.1%)**, followed by moderate (29.1%) and severe forms (9.8%). This distribution closely mirrors observations by **Burrows and Kelton** and **Sainio et al.**, who reported that nearly two-thirds of thrombocytopenia in pregnancy is mild and clinically benign [1,3]. The predominance of **third-trimester diagnosis** in our cohort is consistent with the natural history of **gestational thrombocytopenia**, which is believed to result from hemodilution and increased platelet turnover in late pregnancy [4]. In our study, **gestational thrombocytopenia accounted for 60% of cases**, comparable to rates reported by **McCrae (55–70%)** and other Indian studies [4,5]. These findings reaffirm that gestational thrombocytopenia remains the most frequent and least morbid cause of low platelet counts during pregnancy.

Hypertensive disorders of pregnancy, including **preeclampsia and HELLP syndrome**, constituted **21.1%** of cases in this study. Similar proportions have been reported by **Sibai et al.** and **Goodnight et al.**, where thrombocytopenia served as a marker of disease severity rather than an isolated laboratory abnormality [6,7]. Importantly, these conditions were disproportionately represented among women with **moderate and severe thrombocytopenia**, highlighting their contribution to adverse outcomes. **Immune thrombocytopenic purpura (ITP)** accounted for **10.9%** of cases, aligning with previously reported rates of **5–15%** in tertiary-care settings [8,9]. Although ITP is relatively uncommon, its association with severe thrombocytopenia necessitates close maternal and neonatal monitoring due to the risk of hemorrhage and neonatal thrombocytopenia.

Maternal outcomes in the present study demonstrated a clear association between **thrombocytopenia severity and complications**. The overall incidence of **postpartum hemorrhage (14.9%)** is comparable to rates reported by **Charoenkwan et al.** and **Bussel et al.**, particularly in women with platelet counts below 50,000/µL [10,11]. Notably, **PPH occurred in nearly half (47.1%) of women with severe thrombocytopenia**, underscoring platelet count as a critical determinant of bleeding risk. The rising need for **platelet**

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transfusion (82.3%) and ICU admission (29.4%) in severe cases parallels findings from earlier observational studies [6,11]. Neonatal morbidity in this study was also substantial. The rates of **preterm birth (24%)**, **low birth weight (33.7%)**, and **NICU admission (20.6%)** are comparable to those reported in pregnancies complicated by hypertensive disorders and HELLP syndrome [6,7]. Although **neonatal thrombocytopenia was observed in only 8%**, this aligns with existing literature indicating that most neonates born to thrombocytopenic mothers have normal platelet counts, except in cases of ITP or severe maternal disease [8,12]. The observed **perinatal mortality rate of 4%** likely reflects the severity of underlying maternal conditions rather than thrombocytopenia alone. Overall, these findings reinforce that **thrombocytopenia in pregnancy is a heterogeneous condition**, and clinical outcomes depend largely on **etiology and severity of platelet reduction**. While mild thrombocytopenia is generally benign, **moderate and severe thrombocytopenia—particularly when associated with hypertensive disorders or ITP—pose significant maternal and neonatal risks**. Early detection, etiological evaluation, and multidisciplinary management remain essential for improving outcomes.

Conclusion

Thrombocytopenia in pregnancy is a **common yet heterogeneous condition**, with clinical significance determined primarily by **etiology and severity of platelet reduction**. In this prospective observational study of 350 women, **mild thrombocytopenia—predominantly gestational in origin—was the most frequent and generally associated with favorable maternal and neonatal outcomes**. However, **moderate and severe thrombocytopenia**, particularly when associated with **hypertensive disorders of pregnancy and immune thrombocytopenic purpura**, were linked to a **significantly increased risk of maternal hemorrhage, transfusion requirement, intensive care admission, and adverse neonatal outcomes**. The findings underscore that **thrombocytopenia should not be viewed as a uniform laboratory abnormality**, but rather as a **clinical marker that warrants etiological evaluation and risk stratification**. Increasing severity of thrombocytopenia was independently associated with poorer fetomaternal outcomes, emphasizing the importance of platelet count as a prognostic indicator.

Clinical Implications

- **Routine platelet count estimation** during antenatal care, particularly in the **third trimester**, is essential for early detection of thrombocytopenia.
- **Mild gestational thrombocytopenia** usually requires **reassurance and observation** without aggressive intervention.
- **Moderate to severe thrombocytopenia** mandates **close maternal and fetal surveillance**, with prompt identification of underlying causes such as **preeclampsia, HELLP syndrome, or ITP**.
- **Multidisciplinary management** involving obstetricians, anesthesiologists, hematologists, and neonatologists is crucial in optimizing outcomes in high-risk cases.
- **Delivery planning** should be individualized, with preparedness for **blood and platelet transfusion**, especially in women with platelet counts below 50,000/μL.

Neonatal monitoring, particularly for thrombocytopenia and prematurity-related complications, should be an integral component of postnatal care.

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