Section: OBG

Original Research Article

STUDY OF THROMBOCYTOPENIA IN PREGNANCY CLINICAL PRESENTATION AND ITS OUTCOME

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ABSTRACT

Background: Thrombocytopenia is the second most common hematological abnormality encountered during pregnancy after anemia. Although often benign and detected incidentally, it may also reflect serious pathological conditions associated with significant maternal and fetal morbidity. This study aimed to evaluate the clinical profile of thrombocytopenia in pregnancy and assess its maternal and neonatal outcomes. **Materials and Methods:** This hospital-based prospective observational study was conducted over one year at a tertiary care center. A total of 600 pregnant women were screened, and those with platelet counts <150,000/µL were included. Thrombocytopenia was categorized as mild, moderate, or severe. Etiology was determined based on clinical and laboratory evaluation. Participants were followed until delivery and early postpartum. Maternal and neonatal outcomes were recorded. Statistical analysis was performed using SPSS version 25.0, with multivariate logistic regression to identify predictors of postpartum hemorrhage (PPH). **Results:** The incidence of thrombocytopenia was 7.0% (52/600). Mild thrombocytopenia predominated (65.4%), followed by moderate (25.0%) and severe (9.6%). Gestational thrombocytopenia was the most common etiology (50%), followed by hypertensive disorders (23.1%). Postpartum hemorrhage occurred in 11.5% of cases, and 15.4% required platelet transfusion. Severity of thrombocytopenia showed a significant association with maternal complications ($p = 0.02$). Severe thrombocytopenia independently predicted PPH (AOR 8.5, $p = 0.01$), along with hypertensive disorders (AOR 3.6, $p = 0.04$). Neonatal thrombocytopenia was uncommon (7.7%). **Conclusion:** While most cases of thrombocytopenia in pregnancy are mild and gestational, moderate and severe forms significantly increase maternal morbidity. Early identification and vigilant monitoring are essential to optimize maternal outcomes.

INTRODUCTION

Thrombocytopenia, defined as a platelet count below 150×10⁹/L, is the second most common hematological abnormality encountered during pregnancy after anemia, affecting approximately 5–11% of all pregnancies.[1,3,5] Although often detected incidentally during routine antenatal investigations, thrombocytopenia in pregnancy may range from a benign, self-limiting condition to a manifestation of severe systemic disease with significant maternal and fetal morbidity and mortality.

Gestational thrombocytopenia accounts for nearly 70–75% of cases and is typically mild, asymptomatic, and identified in the late second or third trimester.[5,7] It is not usually associated with adverse maternal or neonatal outcomes and resolves spontaneously after delivery.[5] However, other etiologies such as hypertensive disorders of pregnancy—including preeclampsia and HELLP (Hemolysis, Elevated Liver enzymes, Low Platelets) syndrome—constitute 15–22% of cases and are associated with serious complications including maternal organ dysfunction, placental insufficiency, preterm birth, and perinatal mortality.[5,9] These conditions are characterized by endothelial dysfunction, inflammatory activation, and in some cases complement system dysregulation, contributing to thrombocytopenia and microangiopathy.[9]

Immune thrombocytopenia (ITP) represents another important cause, accounting for approximately 1–

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4% of cases.[5] Unlike gestational thrombocytopenia, ITP may present earlier in pregnancy, often with more severe thrombocytopenia and a history of bleeding. It also carries a risk of neonatal thrombocytopenia due to transplacental passage of antiplatelet antibodies.[7] Management of ITP during pregnancy poses clinical challenges, as treatment options are limited and must balance maternal benefit with fetal safety.[7]

More severe and less common causes include thrombotic microangiopathies such as thrombotic thrombocytopenic purpura (TTP) and atypical hemolytic uremic syndrome (aHUS), which are obstetric emergencies requiring prompt recognition and multidisciplinary management.[2,4] These disorders may clinically overlap with preeclampsia and HELLP syndrome, making early diagnosis difficult but crucial, as delays in appropriate therapy significantly increase the risk of maternal mortality and adverse fetal outcomes.[2,4] Severe thrombocytopenia accompanied by microangiopathic hemolytic anemia in pregnancy demands urgent evaluation to differentiate between these entities and initiate timely intervention.[6]

Given the wide spectrum of etiologies and outcomes, a systematic evaluation based on gestational age at presentation, severity of thrombocytopenia, associated clinical features, and laboratory findings is essential for accurate diagnosis and appropriate management.[1,3] Early identification of high-risk cases enables timely obstetric and hematological intervention, thereby improving maternal and neonatal outcomes.

In view of the diverse clinical presentations and varying prognostic implications, this study aims to evaluate the clinical profile of thrombocytopenia in pregnancy and analyze its maternal and fetal outcomes, thereby contributing to improved diagnostic strategies and management protocols.

MATERIALS AND METHODS

This hospital-based prospective observational study was conducted over a period of one year in the Department of Obstetrics and Gynaecology at Government Medical College and Hospital, Ramanathapuram, a tertiary care referral center catering to both urban and rural populations. The study included all pregnant women aged 18 years and above attending the antenatal outpatient department or admitted for obstetric care during the study period. Women with multiple gestations and all trimesters of pregnancy were eligible. Participants were enrolled consecutively after obtaining written informed consent. Women who declined consent, had incomplete laboratory data, or were known cases of chronic hematological malignancy under active treatment prior to pregnancy were excluded from analysis. Women with pseudothrombocytopenia confirmed on peripheral smear were also excluded.

The sample size was determined based on the expected prevalence of thrombocytopenia in pregnancy, estimated at 10% from previous literature. Using the formula $n = Z^2pq/d^2$, with a 95% confidence level ($Z = 1.96$), expected prevalence (p) of 0.10, allowable error (d) of 2.5%, and accounting for 10% potential attrition, the minimum required sample size was calculated to be approximately 554. During the study period, 600 pregnant women were screened, which exceeded the calculated minimum and improved the study precision.

All enrolled participants underwent detailed clinical evaluation including obstetric history, parity, gestational age, prior history of thrombocytopenia, hypertensive disorders, autoimmune disease, bleeding tendencies, drug exposure, and previous adverse pregnancy outcomes. A comprehensive physical examination was performed with special attention to blood pressure, pallor, petechiae, ecchymosis, hepatosplenomegaly, and signs suggestive of preeclampsia or systemic illness.

Venous blood samples were collected under aseptic precautions and analyzed using an automated hematology analyzer calibrated according to standard laboratory protocols. Thrombocytopenia was defined as a platelet count <150,000/µL (1.5 lakh/cumm). Severity was categorized as mild (100,000–149,999/µL), moderate (50,000–99,999/µL), and severe (<50,000/µL). Peripheral smear examination was performed in all cases with platelet counts <150,000/µL to exclude platelet clumping and to assess morphology. Additional laboratory investigations including liver function tests, renal function tests, serum lactate dehydrogenase, coagulation profile, and autoimmune markers were performed when clinically indicated to establish etiological diagnosis.

Thrombocytopenia was classified etiologically into gestational thrombocytopenia, hypertensive disorders of pregnancy (including preeclampsia, eclampsia, and HELLP syndrome), immune thrombocytopenic purpura, disseminated intravascular coagulation, thrombotic microangiopathy, sepsis-associated thrombocytopenia, and other medical causes. Gestational thrombocytopenia was diagnosed based on mild thrombocytopenia detected in late pregnancy, absence of prior history, absence of associated systemic disease, and spontaneous postpartum recovery.

Participants diagnosed with thrombocytopenia were followed until delivery and during the immediate postpartum period. Maternal outcome variables included mode of delivery, intrapartum and postpartum hemorrhage, need for blood or platelet transfusion, development of HELLP syndrome, disseminated intravascular coagulation, renal failure, puerperal sepsis, intensive care admission, and maternal mortality. Neonatal outcomes included gestational age at birth, birth weight, Apgar scores

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at 1 and 5 minutes, neonatal platelet count, need for neonatal intensive care admission, and perinatal mortality.

Data were entered into a predesigned structured proforma and analyzed using SPSS version 25.0 (IBM Corp., Armonk, NY). Continuous variables were expressed as mean ± standard deviation or median with interquartile range depending on normality distribution assessed by the Shapiro–Wilk test. Categorical variables were summarized as frequency and percentage. Incidence of thrombocytopenia was calculated as proportion of total antenatal women screened. Association between severity of thrombocytopenia and maternal or neonatal outcomes was evaluated using Chi-square test or Fisher's exact test for categorical variables and independent t-test or ANOVA for continuous variables. Multivariate logistic regression analysis was performed to identify independent predictors of adverse maternal and neonatal outcomes, adjusting for confounders such as maternal age, parity, gestational age, and presence of hypertensive disorders. Adjusted odds ratios with 95% confidence intervals were reported. A p-value <0.05 was considered statistically significant.

Ethical clearance was obtained from the Institutional Ethics Committee prior to commencement of the study. All procedures were conducted in accordance with the Declaration of Helsinki, and confidentiality of participant data was strictly maintained.

RESULTS

A total of 600 pregnant women were screened during the study period, among whom 52 were found to have thrombocytopenia, giving an overall incidence of 7.0%. As presented in Table 1, mild thrombocytopenia constituted the majority of cases (65.4%), followed by moderate (25.0%) and severe thrombocytopenia (9.6%). This distribution indicates that most cases detected during routine antenatal screening were clinically less severe. With respect to etiology, gestational thrombocytopenia emerged as the predominant cause, accounting for 50% of cases, while hypertensive disorders of pregnancy contributed to 23.1%. Immune thrombocytopenic purpura, disseminated intravascular coagulation, sepsis, and other causes collectively represented a smaller proportion. This etiological pattern suggests that benign gestational causes account for the majority of cases, although a significant proportion is related to pathological conditions requiring closer surveillance.

Maternal and neonatal outcomes among thrombocytopenic women are summarized in Table 2. Vaginal delivery was the most common mode of delivery (57.7%), while 38.5% underwent caesarean section. Postpartum hemorrhage occurred in 11.5% of women, and 15.4% required platelet transfusion, reflecting the clinical relevance of thrombocytopenia during the intrapartum and postpartum periods. Intensive care admission was required in 7.7% of cases, indicating that a subset of women developed significant morbidity. Regarding neonatal outcomes, low birth weight was observed in 21.2% of neonates, and 19.2% required NICU admission. Neonatal thrombocytopenia was relatively uncommon (7.7%), suggesting that severe neonatal platelet compromise was not frequent despite maternal thrombocytopenia.

The relationship between severity of thrombocytopenia and maternal complications is demonstrated in Table 3. The incidence of postpartum hemorrhage increased progressively with severity: 2.9% in mild cases, 23.1% in moderate cases, and 40.0% in severe cases. Similarly, the requirement for platelet transfusion and ICU admission showed an upward trend with increasing severity. The association between severity and maternal complications was statistically significant (p = 0.02), indicating that moderate and severe thrombocytopenia substantially elevate the risk of adverse maternal outcomes.

Multivariate logistic regression analysis, shown in Table 4, identified severe thrombocytopenia as the strongest independent predictor of postpartum hemorrhage (adjusted odds ratio [AOR] 8.5, p = 0.01), followed by moderate thrombocytopenia (AOR 4.2, p = 0.03). The presence of hypertensive disorders was also independently associated with increased risk (AOR 3.6, p = 0.04). In contrast, maternal age and preterm delivery were not statistically significant predictors. These findings highlight that severity of platelet reduction and underlying hypertensive pathology are key determinants of maternal morbidity.

Overall, the results indicate that while most cases of thrombocytopenia in pregnancy are mild and gestational in origin, moderate and severe thrombocytopenia significantly increase the risk of postpartum hemorrhage and related complications. Early identification and appropriate monitoring are therefore essential to optimize maternal outcomes.

Table 1: Incidence, Severity and Etiology of Thrombocytopenia (n = 600; cases = 52)

Variable	Frequency (n)	Percentage (%)
Incidence (n=600)		
Thrombocytopenia	52	7.0
Severity (n=52)		
Mild (100,000–149,999/µL)	34	65.4
Moderate (50,000–99,999/µL)	13	25.0
Severe (<50,000/µL)	5	9.6
Etiology (n=52)		
Gestational thrombocytopenia	26	50.0

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Hypertensive disorders (Preeclampsia/Eclampsia/HELLP)	12	23.1
Immune thrombocytopenic purpura	6	11.5
Disseminated intravascular coagulation	3	5.8
Sepsis	3	5.8
Others	2	3.8

Table 2: Maternal and Neonatal Outcomes among Thrombocytopenic Women (n = 52)

Outcome	Frequency (n)	Percentage (%)
Vaginal delivery	30	57.7
Caesarean section	20	38.5
Instrumental delivery	2	3.8
Postpartum hemorrhage (PPH)	6	11.5
Platelet transfusion required	8	15.4
ICU admission	4	7.7
Preterm delivery	9	17.3
Low birth weight	11	21.2
NICU admission	10	19.2
Neonatal thrombocytopenia	4	7.7

Table 3: Association between Severity of Thrombocytopenia and Maternal Complications (n = 52)

Severity	PPH n (%)	Transfusion n (%)	ICU Admission n (%)	p-value
Mild (n=34)	1 (2.9)	2 (5.9)	1 (2.9)	
Moderate (n=13)	3 (23.1)	4 (30.8)	2 (15.4)	
Severe (n=5)	2 (40.0)	2 (40.0)	1 (20.0)	
Overall	—	—	—	0.02

Table 4: Multivariate Logistic Regression for Predictors of Postpartum Hemorrhage

Variable	Adjusted Odds Ratio (AOR)	95% CI	p-value
Moderate thrombocytopenia	4.2	1.1–16.0	0.03
Severe thrombocytopenia	8.5	1.5–48.2	0.01
Hypertensive disorder	3.6	1.0–12.4	0.04
Preterm delivery	1.8	0.5–6.4	0.32
Maternal age (>30 years)	1.2	0.3–4.5	0.76

DISCUSSION

The present study found an overall incidence of thrombocytopenia of 7.0% among pregnant women, which is consistent with previously reported rates ranging between 7–10% in obstetric populations.[9-12] Large observational studies have similarly documented that thrombocytopenia is a relatively common hematological abnormality detected during routine antenatal evaluation.

In our study, mild thrombocytopenia accounted for 65.4% of cases, followed by moderate (25.0%) and severe (9.6%) forms. This predominance of mild thrombocytopenia aligns with previous studies where mild reductions in platelet count constituted the majority of cases.[11-13] Severe thrombocytopenia has consistently been reported to occur in less than 10% of affected pregnancies.[13-15] The predominance of milder forms in our cohort supports the widely accepted understanding that most thrombocytopenia detected during pregnancy is clinically benign.

With respect to etiology, gestational thrombocytopenia was the most frequent cause (50%), followed by hypertensive disorders of pregnancy (23.1%). This distribution is comparable to earlier reports, which identify gestational thrombocytopenia as the leading cause, accounting for approximately 60–75% of cases, while hypertensive disorders represent the second most common etiology.[10-18] Although the proportion of gestational thrombocytopenia in our study is slightly lower than in some series, this variation may reflect differences in study population and referral patterns. Pathological causes such as immune thrombocytopenic purpura, disseminated intravascular coagulation, and sepsis constituted a smaller but clinically important proportion, as also described in previous literature.[16,17]

Regarding maternal outcomes, vaginal delivery was the predominant mode of delivery (57.7%), consistent with other studies indicating that thrombocytopenia alone is not an absolute indication for caesarean section.[16,17] The caesarean section rate observed in our study is comparable to rates reported in tertiary care settings where obstetric indications primarily guide operative delivery decisions rather than platelet count alone.[15,18]

Postpartum hemorrhage (PPH) occurred in 11.5% of women in our cohort, which falls within the range reported in comparable studies, particularly among women with moderate to severe thrombocytopenia.[15,16] The requirement for platelet transfusion (15.4%) and ICU admission (7.7%) further underscores the clinical significance of thrombocytopenia in a subset of patients. Previous studies have similarly reported increased maternal morbidity in cases of severe thrombocytopenia and in association with hypertensive disorders such as preeclampsia and HELLP syndrome.[15-17]

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Neonatal outcomes in the present study were generally favorable. Although 21.2% of neonates had low birth weight and 19.2% required NICU admission, neonatal thrombocytopenia was observed in only 7.7% of cases. These findings are consistent with earlier studies demonstrating that significant neonatal thrombocytopenia is uncommon, particularly in gestational thrombocytopenia.[11,14] The literature supports that maternal platelet count does not reliably predict severe neonatal thrombocytopenia in benign gestational cases.[11,14]

A major finding of this study is the significant association between severity of thrombocytopenia and maternal complications. The incidence of PPH increased progressively with worsening platelet counts, and this association was statistically significant ($p = 0.02$). Similar associations between severe thrombocytopenia and hemorrhagic complications have been demonstrated in previous studies.[15,16] Our multivariate logistic regression analysis identified severe thrombocytopenia as the strongest independent predictor of PPH, followed by moderate thrombocytopenia. Prior research likewise indicates that platelet counts below 50,000/µL significantly increase the risk of maternal bleeding complications.[16,17]

Hypertensive disorders were also independently associated with increased risk of PPH in our study, consistent with established evidence linking preeclampsia and HELLP syndrome to coagulopathy and hemorrhagic risk.[15,16] In contrast, maternal age and preterm delivery were not statistically significant predictors, aligning with previous studies that identify platelet severity and underlying pathology as more critical determinants of adverse outcomes.[15,18]

CONCLUSION

The present study demonstrates that thrombocytopenia complicates a significant proportion of pregnancies, with an incidence of 7.0% in our cohort. The majority of cases were mild and attributable to gestational thrombocytopenia, indicating a largely benign clinical course in most women. However, moderate and severe thrombocytopenia were strongly associated with increased maternal morbidity, particularly postpartum hemorrhage, need for platelet transfusion, and intensive care admission. Hypertensive disorders of pregnancy further amplified the risk of adverse maternal outcomes.

Neonatal outcomes were generally favorable, and significant neonatal thrombocytopenia was uncommon, especially in cases of gestational thrombocytopenia. Overall, while most cases of thrombocytopenia in pregnancy are mild and self-limiting, careful evaluation to identify underlying pathological causes and close monitoring of women with moderate to severe thrombocytopenia are essential. Early risk stratification and multidisciplinary management can substantially reduce maternal complications and improve overall obstetric outcomes.

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