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Role of Thrombocytopenia in Predicting Maternal and Perinatal Outcomes in Hypertensive Disorders of Pregnancy

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ABSTRACT

Background:
Thrombocytopenia, defined as a platelet count <150 ×10³/μL, is a common hematological abnormality during pregnancy and is frequently associated with hypertensive disorders. It may significantly influence maternal and perinatal outcomes. **Objectives:** To evaluate the clinical profile and etiological spectrum of thrombocytopenia in pregnancy and to assess its association with maternal and perinatal outcomes. **Methods:** A retrospective observational study was conducted in the Department of Obstetrics and Gynecology at Gandhi Hospital. A total of 120 pregnant women diagnosed with thrombocytopenia were included. Data regarding clinical features, laboratory parameters, etiology, and fetomaternal outcomes were collected and analyzed. **Results:** Pregnancy-induced hypertension (PIH) was the most common etiology, accounting for 45% of cases, followed by gestational thrombocytopenia (30%) and immune thrombocytopenic purpura (13.3%). Moderate thrombocytopenia was the most frequent presentation (59.2%). Vaginal delivery was the predominant mode of delivery (58.3%). Blood transfusion was required in 31.7% of cases, and abruptio placentae was mainly observed in PIH. Prematurity (15.8%) and NICU admissions (10.8%) were the most common perinatal complications. Gestational thrombocytopenia was associated with favorable outcomes, whereas hypertensive disorders, particularly preeclampsia and HELLP syndrome, were associated with increased maternal and perinatal morbidity. **Conclusion:** Thrombocytopenia in pregnancy is most commonly associated with hypertensive disorders and correlates with adverse maternal and perinatal outcomes. Platelet count serves as a simple and cost-effective marker for disease severity and prognosis. Early identification and appropriate management can improve fetomaternal outcomes.

Keywords:
Thrombocytopenia; Pregnancy-induced hypertension; Preeclampsia; HELLP syndrome; Maternal outcome; Perinatal outcome

INTRODUCTION

Hypertensive disorders of pregnancy (HDP) are defined as hypertension that develops for the first time after 20 weeks of gestation and typically resolves following delivery [1]. These disorders constitute one of the most common medical complications of pregnancy and are associated with significant maternal and perinatal morbidity and mortality worldwide [2].

Globally, HDP complicate approximately 10–17% of pregnancies, while in India, the incidence of pregnancy-induced hypertension (PIH) ranges from 5% to 15% [3]. Hemorrhage remains a major contributor to maternal mortality and often coexists with hypertensive disorders, thereby increasing the overall risk to maternal health [4].

Despite advances in obstetric care, there is currently no reliable screening test to predict the onset or severity of hypertensive disorders in pregnancy [5]. Among the various hematological abnormalities observed in HDP, thrombocytopenia is the most common and clinically significant [5]. Platelets are produced in the bone marrow and circulate for approximately 7–10 days before being removed by thereticuloendothelial system. The normal platelet count ranges from 150 to 450 $\times 10^3/\mu L$ and generallyremains unchanged during uncomplicated pregnancy [6].

Thrombocytopenia during pregnancy may arise from physiological or pathological causes. Gestational thrombocytopenia (GT), also referred to as pregnancy-induced thrombocytopenia (PIT), is the most common cause and typically occurs in late gestation. It is usually mild ($>100\times10^3/\mu L$), asymptomatic, and resolves spontaneously after delivery. Severe thrombocytopenia ($<70\times10^3/\mu L$) is rare in GT [7]. Previous studies have reported fetal and/or neonatal thrombocytopenia in approximately 4–13% of cases involving maternal GT [8].

Physiological changes in pregnancy, including plasma volume expansion leading to hemodilution, may contribute to a relative decrease in platelet count . The incidence of thrombocytopenia in pregnancy has been reported to be around 5–7% . In nearly 75% of cases, the exact etiology of GT remains unclear, although increased platelet consumption within the placental circulation and hormonal influences on megakaryopoiesis have been proposed as underlying mechanisms [9-10]. Immune thrombocytopenic purpura (ITP) is another important cause of thrombocytopenia in pregnancy and is characterized by autoimmune-mediated platelet destruction. Differentiating ITP from gestational thrombocytopenia may be challenging; however, ITP is typically associated with more severe thrombocytopenia and may result in neonatal thrombocytopenia due to transplacental transfer of antiplatelet antibodies [11].

Hypertensive disorders, particularly preeclampsia and eclampsia, are strongly associated with thrombocytopenia. The frequency and severity of thrombocytopenia increase with the severity of the disease and are more pronounced in patients with HELLP syndrome (hemolysis, elevated liver enzymes, and low platelet count) or disseminated intravascular coagulation [12]. Thrombocytopenia has been reported in approximately 15–18% of preeclampsia cases and up to 30% of eclampsia cases [13]. In addition to hypertensive disorders, other conditions such as infections (e.g., dengue), systemic diseases (e.g., systemic lupus erythematosus), and coagulation disorders can contribute to thrombocytopenia in pregnancy [10]. In tropical countries, infectious etiologies play a significant role and should be considered during evaluation.

Although several biochemical markers such as placental protein 13 and endoglin have been proposed to predict the severity of hypertensive disorders, their routine use is limited due to cost and availability, especially in resource-limited settings [6]. Therefore, there is a need for a simple, cost-effective, and easily accessible parameter for early risk stratification.

Platelet count, being a routinely available and economical investigation, may serve as a useful prognostic marker in hypertensive pregnancies. The degree of thrombocytopenia may

reflect disease severity and help predict maternal and perinatal outcomes. Therefore, the present study was undertaken to evaluate the role of thrombocytopenia in predicting maternal and perinatal outcomes in hypertensive disorders of pregnancy and to correlate the severity of thrombocytopenia with clinical outcomes.

Materials and Methods

Sources of data

Data were collected from the records of pregnant women admitted to the Department Obstetrics & Gynecology, Shri Balaji Institute of Medical Sciences, Raipur, Chhattisgarh

Methodology

This observational retrospective study analyzed records of 120 pregnant women from July 2021 to April 2022, after approval from the institutional Ethical Clearance Committee. Data included detailed histories, high-risk factors, past obstetric history, complications during present and past pregnancies, and relevant examinations. Laboratory tests and imaging studies were performed, and maternal and perinatal outcomes were observed.

Laboratory analysis

Platelet count was performed using manual and automated haematology methods.

Inclusion criteria

Records of Antenatal women who were admitted to the hospital with thrombocytopenia.

Exclusion criteria

Records of Patients who were diagnosed with thrombocytopenia but on anticoagulants in diseases like thromboembolic disorders including antiphospholipid antibody syndrome, previous deep vein thrombosis and bad obstetric history, drug-induced thrombocytopenia, were excluded.

Study design

Observational retrospective study.

Results and Analysis

Table 1: Etiology of thrombocytopenia

Etiology	No. of Pregnant Women (n=120)	Percentage (%)
Pregnancy induced hypertension	54	45.0%
Gestational	36	30.0%
Thrombocytopenia (ITP)	16	13.3%
Thrombocytopenia (Dengue)	12	10.0%
Thrombocytopenia (SLE)	2	1.7%
Total	**120**	**100%**

Out of 120 cases analyzed, pregnancy-induced hypertension was the most common etiology, accounting for 54 cases (45%). Gestational thrombocytopenia followed closely behind, with 36 cases (30%). Other etiologies included immune thrombocytopenic purpura (ITP) with 16 cases (13.3%), dengue with 12 cases (10%), and systemic lupus erythematosus (SLE) with 2 cases (1.7%).

Table 2: Degree of thrombocytopenia

Degree of Thrombocytopenia	PIH	Gestational Thrombocytopenia	ITP	Others	Total
Mild	4 (3.3%)	19 (15.8%)	0 (0%)	1 (0.8%)	24 (20.0%)
Moderate	44 (36.7%)	17 (14.2%)	6 (5.0%)	4 (3.3%)	71 (59.2%)
Severe	6 (5.0%)	0 (0%)	10 (8.3%)	9 (7.5%)	25 (20.8%)
Total	54 (45.0%)	36 (30.0%)	16 (13.3%)	14 (11.7%)	120 (100%)

Table 2 the distribution of cases based on the degree of thrombocytopenia across different etiologies. Moderate thrombocytopenia was the most common across all
etiologies, comprising 59.2% of cases, followed by severe thrombocytopenia at 20.8% and mild thrombocytopenia at 20%.

Table 3: Co-morbidity distribution

Co-Morbidity	PIH	Gestational Thrombocytopenia	ITP	Others	Total
Anaemia	20 (16.7%)	0 (0%)	2 (1.7%)	2 (1.7%)	26 (21.7%)
Gestational Diabetes Mellitus	5 (4.2%)	9 (7.5%)	5 (4.2%)	6 (5.0%)	25 (20.8%)
Hypothyroidism	7 (5.8%)	0 (0%)	5 (4.2%)	0 (0%)	12 (10.0%)

Table 3 displays the distribution of co-morbidities among different etiologies of thrombocytopenia in pregnancy. Anaemia was the most prevalent co-morbidity, affecting 21.7% of cases, followed by gestational diabetes mellitus at 20.8%, and hypothyroidism at 10%.

Table 4: Mode of delivery distribution

Mode of Delivery	PIH	Gestational Thrombocytopenia	ITP	Others	Total
Vaginal Delivery	35 (29.2%)	11 (9.2%)	11 (9.2%)	13 (10.8%)	70 (58.3%)
Caesarean	19 (15.8%)	25 (20.8%)	5 (4.2%)	1 (0.8%)	50 (41.7%)

Table 4 presents the distribution of mode of delivery among different etiologies of thrombocytopenia in pregnancy. Vaginal delivery was the most common mode of delivery overall, representing 58.3% of cases, while cesarean section was performed in 41.7% of cases.

Table 5: Maternal complications

Complication	PIH	Gestational Thrombocytopenia	ITP	Others	Total
Abruptio Placentae	6 (5.0%)	0 (0%)	0 (0%)	0 (0%)	6 (5.0%)
Postpartum	1 (0.8%)	1 (0.8%)	0 (0%)	1	4

Hemorrhage				(0.8%)	(3.3%)
Blood Transfusions	10 (8.3%)	4 (3.3%)	12 (10.0%)	12 (10.0%)	38 (31.7%)
Maternal Mortality	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)

Table 5 summarizes the maternal complications observed across different etiologies of thrombocytopenia in pregnancy. Abruptio placentae, postpartum hemorrhage, and blood transfusions were among the complications noted, with varying frequencies among the different conditions. Fortunately, there were no cases of maternal mortality reported in this study

Table 6: Perinatal complications

Complications	**PIH**	**Gestational Thrombocytopenia**	**ITP**	**Others**	**Total**
Prematurity	13 (10.8%)	3 (2.5%)	0 (0%)	3 (2.5%)	19 (15.8%)
Intrauterine Growth Restriction (IUGR)	5 (4.2%)	0 (0%)	0 (0%)	1 (0.8%)	6 (5.0%)
Neonatal Thrombocytopenia	0 (0%)	0 (0%)	3 (2.5%)	0 (0%)	3 (2.5%)
NICU Admissions	4 (3.3%)	0 (0%)	7 (5.8%)	2 (1.7%)	13 (10.8%)
Intrauterine Fetal Death	1 (0.8%)	1 (0.8%)	0 (0%)	2 (1.7%)	4 (3.3%)
Neonatal Death	2 (1.7%)	0 (0%)	0 (0%)	0 (0%)	2 (1.7%)

Table 6 illustrates the perinatal complications associated with different etiologies of thrombocytopenia in pregnancy. Prematurity, intrauterine growth restriction (IUGR), neonatal thrombocytopenia, NICU admissions, intrauterine fetal death, and neonatal death were among the complications observed, with varying frequencies across the different conditions.

DISCUSSION

This study sheds light on the significant impact thrombocytopenia has on pregnancy, corroborating its status as the second most common hematological disorder during this period. By analyzing data from your obstetric unit, provided valuable insights into the various co morbidities, etiologies, and outcomes associated with thrombocytopenia in pregnancy. This comparative analysis is essential for understanding how the findings align with previous studies and observations, thereby contributing to the existing body of knowledge on this topic. It's through such rigorous examination and comparison that we advance our understanding and approach to managing thrombocytopenia in pregnant individuals.

Etiology of Thrombocytopenia

In the present study, pregnancy-induced hypertension (PIH) was the most common etiology, accounting for **45% of cases**, followed by gestational thrombocytopenia (30%), immune thrombocytopenic purpura (ITP) (13.3%), dengue (10%), and systemic lupus erythematosus (SLE) (1.7%). These findings differ from earlier studies, where gestational thrombocytopenia has been consistently reported as the most frequent cause. Azeredo EL et al. reported gestational thrombocytopenia in 76.6% of cases, with PIH contributing to only 20.3% and ITP 3.1% [14]. Similarly, Parnas et al. observed gestational thrombocytopenia in 59.3% of cases and PIH in 22.1% [15]. McCrae et al. also reported gestational thrombocytopenia as the predominant etiology (75%) [16].

The higher prevalence of PIH and ITP in the present study may be explained by the tertiary care referral nature of the study setting, where complicated and high-risk pregnancies are more frequently encountered. Referral bias likely contributes to the overrepresentation of hypertensive and immune-mediated conditions. An important observation in this study is the relatively high proportion of dengue-associated thrombocytopenia (10%), which reflects the endemic nature of dengue infection in tropical regions like India. Dengue causes thrombocytopenia through increased peripheral destruction and bone marrow suppression, and should be considered an important differential diagnosis, especially during the monsoon season [17].

Severity of Thrombocytopenia

Moderate thrombocytopenia was the most common presentation in this study (59.2%), followed by severe (20.8%) and mild (20%). Moderate thrombocytopenia was predominantly associated with PIH, whereas severe thrombocytopenia was more commonly seen in ITP and other secondary causes. These findings are consistent with previous studies, which have shown that gestational thrombocytopenia is usually mild, PIH-related thrombocytopenia is typically moderate, and ITP is more likely to present with severe thrombocytopenia [18].

Co-morbidities

Anaemia was the most common co-morbidity (21.7%), followed by gestational diabetes mellitus (20.8%) and hypothyroidism (10%). The high prevalence of anaemia is consistent with national data from India, where iron deficiency remains a significant public health issue among pregnant women [19]. The coexistence of thrombocytopenia with metabolic and endocrine disorders highlights the need for comprehensive antenatal evaluation and multidisciplinary management to optimize maternal and fetal outcomes.

Mode of Delivery

Vaginal delivery was the most common mode of delivery (58.3%), while cesarean section was performed in 41.7% of cases. A higher rate of cesarean section was observed among patients with PIH and gestational thrombocytopenia, likely due to obstetric indications. These findings are in agreement with existing literature, which suggests that the mode of delivery in thrombocytopenic patients should be guided primarily by obstetric indications rather than platelet count alone, except in cases of severe thrombocytopenia where bleeding risk must be considered [20].

Maternal Outcomes

The most common maternal complication was the requirement for blood transfusion (31.7%), followed by abruptio placentae (5%) and postpartum hemorrhage (3.3%). Notably, no maternal mortality was observed. The high transfusion rate may be attributed to the combined effects of anemia, moderate to severe thrombocytopenia, and increased obstetric interventions in high-risk pregnancies. Abruptio placentae was seen exclusively in PIH cases, which is consistent with the established association between hypertensive disorders and placental abruption [21]. The absence of maternal mortality in this study underscores the importance of early diagnosis, close monitoring, and timely intervention in improving maternal outcomes.

Perinatal Outcomes

Prematurity was the most common perinatal complication (15.8%), followed by NICU admissions (10.8%), intrauterine growth restriction (5%), intrauterine fetal death (3.3%), and neonatal death (1.7%). Prematurity and IUGR were more commonly associated with PIH, reflecting the impact of placental insufficiency in hypertensive disorders. Neonatal thrombocytopenia was observed only in ITP cases (2.5%), which can be explained by the transplacental passage of maternal antiplatelet antibodies [18]. The higher rate of NICU admissions, particularly in ITP cases, may be due to neonatal complications such as thrombocytopenia and prematurity.

CONCLUSION

The present study demonstrates that thrombocytopenia in pregnancy is a heterogeneous condition with diverse etiologies and clinical outcomes. While gestational thrombocytopenia is generally benign, conditions such as PIH, ITP, and dengue are associated with increased maternal and perinatal morbidity. A systematic approach involving early identification of etiology, regular monitoring of platelet counts, and appropriate obstetric management is essential to improve fetomaternal outcomes.

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