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FETOMATERNAL OUTCOME OF THROMBOCYTOPENIA IN PREGNANCY

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Abstract

Pregnancy is associated with substantial physiological adaptation of the maternal haematological system, and even minor deviations in platelet count can affect both maternal and fetal well-being. Thrombocytopenia, defined as a platelet count below 150,000/µL, is the second most common haematological abnormality in pregnancy after anaemia, with reported prevalence ranging from 6.6% to 11.6%. While gestational thrombocytopenia is the most frequent and benign cause, other aetiologies such as immune thrombocytopenic purpura, preeclampsia, HELLP syndrome, acute fatty liver of pregnancy and infections can indicate serious systemic disease and adversely affect outcomes. This prospective case-control study was undertaken to identify the aetiological factors responsible for thrombocytopenia in pregnancy and to evaluate its maternal and fetal outcomes. The study was conducted in the Department of Obstetrics and Gynaecology, B. J. Medical College and Civil Hospital, Ahmedabad, over a period of two years (October 2023-October 2025). One hundred antenatal women were enrolled, comprising 50 women with thrombocytopenia (platelet count <150,000/µL) as cases and 50 women with normal platelet counts as controls, and were followed prospectively till delivery. Gestational thrombocytopenia was the commonest cause (52%), followed by immune thrombocytopenic purpura (20%), viral infections (12%), preeclampsia (8%), HELLP syndrome (6%) and acute fatty liver of pregnancy (2%). Moderate thrombocytopenia was the most frequent severity category (50%). Women with thrombocytopenia had a significantly earlier mean gestational age at delivery, a higher requirement for blood product transfusion, and a higher rate of pancytopenia compared with controls. Fetal and neonatal outcomes, including low birth weight, preterm birth, intrauterine growth restriction, NICU admission, intrauterine death and perinatal mortality, were all significantly worse among women with thrombocytopenia. Maternal complications such as abruption, postpartum haemorrhage and disseminated intravascular coagulation were more frequent among cases, although the difference did not reach statistical significance. This study confirms that thrombocytopenia in pregnancy, though frequently due to a benign gestational cause, is associated with a significantly increased risk of adverse maternal and, more prominently, fetal outcomes, underscoring the need for early aetiological diagnosis, close antenatal surveillance and multidisciplinary management to optimise outcomes for both mother and baby.

Keywords: *Thrombocytopenia, Pregnancy, Gestational thrombocytopenia, Immune thrombocytopenic purpura, Maternal outcome, Fetal outcome.*

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INTRODUCTION

Pregnancy induces substantial physiological changes in the maternal haematological system, and even minor deviations in platelet count can influence both maternal and fetal wellbeing [1]. Platelets normally comprise 0.1–0.2% of total blood volume and are central to haemostasis, wound healing and vascular integrity. During normal pregnancy, plasma volume expansion of up to 50%, increased platelet consumption in the uteroplacental circulation and mild splenic sequestration lead to a modest, physiological decline in platelet count that is generally benign, does not impair platelet function, and resolves postpartum [1,2].

Thrombocytopenia, defined as a platelet count below 150,000/µL, is the second most common haematological abnormality encountered in pregnancy after anaemia; its prevalence ranges from 6.6% to 11.6%, with gestational thrombocytopenia accounting for nearly 70% of cases [3,4]. The American College of Obstetricians and Gynaecologists classifies

thrombocytopenia in pregnancy as mild (100,000–150,000/μL), moderate (50,000–100,000/μL) or severe (<50,000/μL) [5].

While gestational thrombocytopenia is a benign, self-limiting condition, other causes may indicate serious systemic disease and carry a considerably different prognosis, underscoring the importance of a systematic differential diagnosis [6,7]. Immune thrombocytopenic purpura (ITP) results from autoantibody-mediated platelet destruction and impaired platelet production [8], and its management is guided by American Society of Hematology consensus recommendations [9]. Preeclampsia and HELLP syndrome (haemolysis, elevated liver enzymes, low platelets) are associated with endothelial dysfunction and consumptive thrombocytopenia and carry a substantial risk of maternal morbidity [10-12]. Infections, particularly dengue, can cause thrombocytopenia through bone marrow suppression, immune-mediated platelet destruction and increased consumption, and have been associated with adverse pregnancy outcomes in endemic regions [13,14].

Differentiating between these aetiologies is clinically important because it directly influences maternal and fetal management and prognosis [15,16]. Thrombocytopenia increases the risk of maternal complications such as postpartum haemorrhage, abruptio placentae and, in severe cases, multi-organ dysfunction [17,18]. It is also associated with adverse fetal outcomes, including intrauterine growth restriction, preterm birth and neonatal thrombocytopenia, particularly when autoimmune or alloimmune mechanisms are implicated, since maternal platelet autoantibodies can cross the placenta and affect the fetal platelet count [19,20].

Given this diversity of aetiology and outcome, early identification and aetiological classification of thrombocytopenia are essential to guide antenatal surveillance and interdisciplinary management involving obstetricians, haematologists and neonatologists [21,22].

Although thrombocytopenia in pregnancy is well described in Western literature, data from Indian tertiary care settings correlating specific aetiologies with detailed maternal and neonatal outcomes remain comparatively limited, particularly with respect to parameters such as pancytopenia, blood product requirement and neonatal intensive care unit (NICU) admission [23]. This study was therefore undertaken to identify the various factors responsible for thrombocytopenia in pregnancy and to evaluate its maternal and fetal outcomes in comparison with women with normal platelet counts, so as to aid clinicians in early recognition and risk stratification of this common but heterogeneous disorder.

AIMS AND OBJECTIVES

1. To identify the various factors responsible for thrombocytopenia in pregnancy.
2. To evaluate maternal outcome in patients with thrombocytopenia in pregnancy.
3. To evaluate fetal outcome in patients with thrombocytopenia in pregnancy.

MATERIALS AND METHODS

Study design, setting and duration

This prospective case-control study was conducted in the Department of Obstetrics and Gynaecology, B. J. Medical College and Civil Hospital, Ahmedabad, a tertiary care referral centre of central Gujarat, over a period of two years (October 2023 to October 2025), following approval of the Institutional Ethics Committee and after obtaining written informed consent from all participants in their local language.

Subject selection

A total of 100 antenatal women were enrolled by random selection from the routine antenatal outpatient department. Fifty women with a platelet count below 150,000/μL on routine complete blood count constituted the cases (thrombocytopenia group), and 50 women with a platelet count above 150,000/μL constituted the controls.

Inclusion criteria	Exclusion criteria
Antenatal women willing to participate and give informed consent	Patients with chronic liver disease
Cases: platelet count <150,000/μL	Patients on warfarin or other anticoagulant therapy
Controls: platelet count >150,000/μL	Patients on chemotherapy

Study protocol: tests and investigations

Two millilitres of venous blood was collected in an EDTA vacutainer from each participant and processed in the hospital laboratory for a complete blood count. Enrolled women underwent detailed history taking (last menstrual period, expected date of delivery, obstetric and menstrual history, past medical and family history) and general and obstetric examination at each antenatal visit; platelet counts were repeated and monitored as required, and additional investigations (liver and renal function tests, coagulation profile, lactate dehydrogenase, and viral markers) were performed where clinically indicated to establish the aetiology of thrombocytopenia. Both groups were followed until delivery, and maternal, perinatal and neonatal outcomes were recorded and compared between the two groups. Data were entered in Microsoft Excel (Microsoft Corporation, Redmond, WA, USA) for analysis.

Statistical Analysis

Data were compiled and analysed using Microsoft Excel. Categorical variables were expressed as number and percentage and compared between the thrombocytopenia and control groups using the Chi-square test or Fisher's exact test, as appropriate. Continuous variables were expressed as mean ± standard deviation and compared using Student's t-test. Odds ratios were calculated where relevant to estimate the risk of adverse outcomes. A p value of less than 0.05 was considered statistically significant.

RESULTS AND DISCUSSION

Baseline characteristics

A total of 100 antenatal women were studied, 50 with thrombocytopenia (platelet count <150,000/µL) and 50 with normal platelet counts. The mean age of the thrombocytopenia group was 28.02 ± 5.33 years, comparable to that of the control group (28.22 ± 5.60 years; p=0.85), and to studies by Singh et al [24] (74% of cases below 35 years of age) and Harde et al [25] (mean age 25.27 years). Multigravida status was more frequent among women with thrombocytopenia (46%) than controls (30%), although the difference was not statistically significant; this observation is consistent with studies by Prajapati et al [26] (59%), Singh N et al [27] (64%), Katke et al [28] (65%) and Begam et al [23] (69%), all of which reported multigravida women to be at higher risk of thrombocytopenia.

Aetiology and severity of thrombocytopenia

Among the 50 cases, gestational thrombocytopenia was the most common cause (52%), followed by immune thrombocytopenic purpura (20%), viral infections (12%; dengue 8%, hepatitis B surface antigen positivity 2%, chikungunya 2%), preeclampsia (8%), HELLP syndrome (6%) and acute fatty liver of pregnancy (2%) (Table 1). Mild, moderate and severe thrombocytopenia were seen in 28%, 50% and 22% of cases respectively, with a mean platelet count of 114,210/µL, comparable to the mean of 116,500/µL reported by Roy et al [29]. The distribution of aetiologies was broadly similar to that of Parnas et al [30] (gestational thrombocytopenia 59.3%, ITP 11%, hypertensive causes 22%) but differed from Deo et al [31] and Arora et al [32], likely reflecting differences in population characteristics and referral pattern between centres. The severity distribution in the present study also differed from Modi et al [33] (mild 56%, moderate 26%, severe 17%) and Vanaja et al [34], suggesting that the proportion of severe thrombocytopenia varies considerably with the underlying case-mix of aetiologies across different centres.

Table 01: Aetiology and severity of thrombocytopenia among cases

Cause of thrombocytopenia	Number	%
Gestational thrombocytopenia	26	52
Immune thrombocytopenic purpura	10	20
Viral infections	6	12
Preeclampsia	4	8
HELLP syndrome	3	6
Acute fatty liver of pregnancy	1	2
Severity of thrombocytopenia	**Number**	**%**
Mild (100,000-150,000/µL)	14	28
Moderate (50,000-100,000/µL)	25	50
Severe (<50,000/µL)	11	22

Maternal outcomes

Vaginal delivery was the predominant mode of delivery in both groups (68% in the thrombocytopenia group vs 56% in controls; p=0.303), consistent with Prajapati et al [26] (67%) and Singh N et al [27] (61.5%). Mean gestational age at delivery was significantly lower in the thrombocytopenia group (36.73 ± 3.15 weeks) than in controls (38.66 ± 2.2 weeks; p=0.0006), comparable to Usha et al [35] (36 weeks) but lower than Dwivedi et al [36] (38 weeks). Pancytopenia was observed in 12% of thrombocytopenia cases versus none in controls (p=0.035), a higher rate than the 2.5-3% reported by Usha et al [35] and Parnas et al [30], and notably higher than the multi-organ involvement described in severe thrombocytopenia with microangiopathic features by Kamphuis et al [37], possibly reflecting the greater proportion of immune and viral aetiologies in the present cohort. Requirement for blood or blood product transfusion was significantly higher among cases (76%) than controls (18%; p<0.00001), exceeding rates reported by Katherashala et al [38] (34.5%) and Kumari et al [39] (43%), and consistent with the increased transfusion requirement documented among obstetric ITP patients by Webert et al [40] in their eleven-year retrospective analysis. Among women with ITP, 50% required corticosteroid therapy and one patient required the thrombopoietin receptor agonist eltrombopag postpartum with a favourable platelet response, an approach supported by the severe ITP cohort study of Care et al [41] and by reviews on the use of thrombopoietin receptor agonists in pregnancy by Michel et al [42] and McCrae [43]. Maternal complications-abruptio placentae (14%), postpartum haemorrhage (24%), acute kidney injury (6%), disseminated intravascular coagulation (8%), obstetric hysterectomy (2%), and vulval or caesarean stitch-line haematoma (6% and 2% respectively)-were more frequent among cases than controls, though the difference did not reach statistical significance, findings broadly comparable to those reported by Roy et al [29] and Singh et al [24]; an increased risk of postpartum haemorrhage with severe thrombocytopenia has also been highlighted by Kuwabara et al [18] in a retrospective cohort of 195 pregnant women.

Table 02: Maternal outcomes among cases and controls

Outcome	Controls n(%)	Cases n(%)	p value
Vaginal delivery	28 (56)	34 (68)	0.303
Caesarean section	22 (44)	16 (32)	NS
Pancytopenia	0 (0)	6 (12)	0.035*
Blood/blood product transfusion	9 (18)	38 (76)	<0.00001*
Any maternal complication	10 (20)	20 (40)	NS

NS = not statistically significant; *statistically significant (p<0.05).

Fetal and neonatal outcomes

Neonatal outcome was significantly poorer in the thrombocytopenia group, with live births in 84%

compared with 98% of controls (p=0.033); intrauterine death and perinatal mortality occurred in 8% of cases each, compared with 2% and 0% of controls respectively. Mean birth weight was significantly lower among neonates of thrombocytopenic mothers (2.79 ± 0.75 kg) than controls (3.26 ± 0.63 kg; p=0.009). Preterm birth (34% vs 18%; odds ratio 2.61, p=0.037) and intrauterine growth restriction (22% vs 8%; odds ratio 3.54, p=0.046) were significantly more common among cases, and NICU admission was required in 52% of neonates of thrombocytopenic mothers compared with 34% of controls (odds ratio 2.447, p=0.032). These findings are consistent with Parnas et al [30] (preterm 25.6%, IUGR 20.5%), Varghese et al [44] (preterm 29.5%, IUGR 16%) and the recent series by Thapliyal et al [45]. Neonatal thrombocytopenia was uncommon in this cohort (2% vs 0%; p=1.0), comparable to the 1.5% reported by Varghese et al [44], to the low incidence of neonatal thrombocytopenia described by Samuels et al [20] among offspring of women with ITP, and to the prospective observations of Sumathy et al [46]. Overall, the pattern of increased fetal morbidity without a proportionate rise in severe maternal complications observed in this study mirrors the diagnostic and management approach outlined by Park [47].

Table 3: Fetal and neonatal outcomes among cases and controls

Outcome	Controls n(%)	Cases n(%)	p value
Live birth	49 (98)	42 (84)	0.033*
Intrauterine death	1 (2)	4 (8)	-
Perinatal mortality	0 (0)	4 (8)	-
Mean birth weight (kg, mean±SD)	3.26 ± 0.63	2.79 ± 0.75	0.009*
Preterm birth	9 (18)	17 (34)	0.037*
Intrauterine growth restriction	4 (8)	11 (22)	0.046*
NICU admission	17 (34)	26 (52)	0.032*
Neonatal thrombocytopenia	0 (0)	1 (2)	1.0

*statistically significant (p<0.05).

CONCLUSION

This study highlights that thrombocytopenia in pregnancy is a common haematological disorder with diverse aetiologies, the most frequent being gestational thrombocytopenia, followed by immune thrombocytopenic purpura, hypertensive disorders, viral infections and acute fatty liver of pregnancy. Thrombocytopenia was more prevalent among multigravida women and was associated with an increased risk of maternal and fetal complications. Although the mode of delivery was comparable between the two groups, women with thrombocytopenia had a significantly higher incidence of preterm delivery, blood transfusion requirement and pancytopenia. Maternal complications such as placental abruption, postpartum haemorrhage, acute kidney injury and disseminated intravascular coagulation were more frequently observed among cases, though not statistically significant. Fetal outcomes, including low birth weight, intrauterine growth restriction and preterm birth, were significantly worse among thrombocytopenic mothers, and intrauterine death, perinatal mortality and NICU admission were also significantly increased. Early diagnosis, careful antenatal monitoring, appropriate management including the use of steroids or thrombopoietin receptor agonists in selected cases, and multidisciplinary care are essential to optimise outcomes for both mother and baby.

ETHICAL CONSIDERATIONS

The study protocol was approved by the Institutional Ethics Committee of B. J. Medical College, Ahmedabad, and was conducted in accordance with the ethical standards of the institution. Written informed consent was obtained from all participants in their local language prior to enrolment, and participants were informed that the study was non-commercial, that their identity and data would remain confidential, and that they were free to withdraw from the study at any time.

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AUTHORS' CONTRIBUTION STATEMENT

Dr Yogita Kambaliya conceptualised and designed the study, collected and analysed the data, and prepared and approved the final manuscript. Dr Sugandha Patel guided collection of data and helped analyse data . Dr VishvaSangani helped in statistical analysis of data.

CONFLICT OF INTEREST

Conflict of interest declared none.

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