

Evaluation of Prothrombin Time, International Normalized Ratio and Platelet Counts Among Women Presenting with Vaginal Bleeding in the First Trimester of Pregnancy

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Conflict of interest: Nil

Abstract:

Background and Objective: Vaginal bleeding during the first trimester of pregnancy is a frequent obstetric emergency that can indicate a range of conditions from benign threatened miscarriage to life-threatening complications such as ectopic or molar pregnancy. Hemostatic abnormalities may contribute to adverse outcomes, yet they are often under-evaluated in routine practice. This study aimed to assess Prothrombin Time (PT), International Normalized Ratio (INR), and platelet counts among women presenting with vaginal bleeding in the first trimester and to analyze their association with clinical outcomes.

Methods: A retrospective observational study was conducted in the Department of Obstetrics and Gynecology, Government Medical College, Purnea, Bihar, India, over a period of 12 months. Medical records of 95 women with gestational age $\leq 13 + 6$ weeks who presented with vaginal bleeding and had coagulation profiles recorded were reviewed. Data regarding demographic characteristics, clinical diagnosis, laboratory parameters, and maternal outcomes were analyzed using descriptive and comparative statistics, with $p < 0.05$ considered significant.

Results: The mean age of participants was 26.4 ± 4.6 years, and the mean gestational age was 9.1 ± 2.1 weeks. Threatened miscarriage was the most common presentation (46.3%), followed by incomplete abortion (21%). Prolonged PT was observed in 26.3%, elevated INR in 22.1%, and thrombocytopenia in 18.9% of women. Abnormal coagulation parameters were significantly associated with increased hospital admission ($p < 0.05$) and blood transfusion rates ($p < 0.05$).

Conclusion: Deranged PT, INR, and platelet counts are common among women with first-trimester bleeding and correlate with adverse clinical outcomes. Routine coagulation assessment should be included in the initial evaluation of such patients to guide timely management.

Keywords: First trimester bleeding; Prothrombin time; INR; Platelet count; Coagulation profile; Pregnancy complications.

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Introduction

Vaginal bleeding in early pregnancy is a frequent cause of emergency obstetric visits, with an incidence ranging from 20–25% among all pregnancies. While many cases are benign, such as threatened miscarriage, others are associated with significant maternal morbidity including hemorrhage, anemia, and, rarely, disseminated intravascular coagulation (DIC).

The hemostatic system undergoes major physiological adaptations during pregnancy. However, abnormal bleeding may unmask underlying coagulation derangements or consumptive processes, particularly in cases like incomplete abortion, ectopic, or molar pregnancy. Evaluation of PT, INR, and platelet counts can provide valuable insight into the hemostatic status and help anticipate complications.

Despite their importance, routine coagulation screening is not consistently performed for all women presenting with early pregnancy bleeding, especially in resource-limited settings. This study aimed to assess PT, INR, and platelet levels and correlate these with clinical outcomes in first-trimester vaginal bleeding cases.

Materials and Methods

Study design and setting: A retrospective cross-sectional study was conducted in the Department of Obstetrics and Gynecology, Government Medical College, Purnea, Bihar, India, over a period of 12 months (October 2023 – September 2024). Approval was obtained from the Institutional Ethics Committee prior to data collection.

Study population: Medical records of 95 women presenting to the emergency or outpatient department with vaginal bleeding in the first trimester ($\leq 13 + 6$ weeks) were included.

Inclusion criteria

- Confirmed intrauterine or ectopic pregnancy $\leq 13 + 6$ weeks
- Documented PT, INR, and platelet count at presentation

Exclusion criteria

- Known pre-existing coagulation disorders
- Use of anticoagulant or antiplatelet drugs
- Chronic liver or renal disease
- Incomplete records

Data collection: Demographic and obstetric data (age, gravida, parity, gestational age, bleeding severity), clinical diagnosis (threatened, incomplete, complete, missed, ectopic, molar), and laboratory parameters (PT, INR, platelet count, hemoglobin) were abstracted using a structured proforma.

Definitions

- **Abnormal PT:** > 13.5 seconds
- **Abnormal INR:** > 1.2

- **Thrombocytopenia:** $< 150 \times 10^9/L$
- **Clinical outcomes:** hospital admission, need for transfusion, management type, ICU stay, and duration of hospitalization.

Statistical analysis: Data were analyzed using SPSS v26. Continuous variables were expressed as mean $\pm$ standard deviation; categorical variables as number and percentage. Associations between coagulation abnormalities and clinical outcomes were tested using Chi-square or Fisher's exact test, with $p < 0.05$ considered significant.

Results

Baseline Characteristics: A total of 95 women presenting with vaginal bleeding during the first trimester of pregnancy were analyzed. The mean age of the study participants was 26.4 ± 4.6 years, ranging from 18 to 39 years. The mean gestational age at presentation was 9.1 ± 2.1 weeks. The majority of women were multigravida (62%), and 58% were unbooked cases. Most patients presented within the first 10 weeks of gestation.

The distribution of clinical categories is shown in Table 1.

Table 1: Distribution of clinical categories among study participants (n = 95)

Clinical Category	Number (%)
Threatened miscarriage	44 (46.3)
Incomplete abortion	20 (21.0)
Complete abortion	10 (10.5)
Missed abortion	8 (8.4)
Ectopic pregnancy	7 (7.4)
Molar pregnancy	6 (6.3)

Laboratory Parameters: The mean PT (patient) was 13.3 ± 1.4 seconds, the mean INR 1.09 ± 0.16 , and mean platelet count $224 \pm 56 \times 10^9/L$. Overall, 26.3% of women had prolonged PT, 22.1% had

elevated INR, and 18.9% were thrombocytopenic. Hemoglobin values ranged from 7.5 to 14.5 g/dL, with a mean of 11.2 ± 1.2 g/dL.

Table 2: Coagulation parameters among study participants

Parameter	Mean $\pm$ SD	Abnormal n (%)
PT (patient) (s)	13.3 ± 1.4	25 (26.3)
INR	1.09 ± 0.16	21 (22.1)
Platelet count ($\times 10^9/L$)	224 ± 56	18 (18.9)

Abnormal coagulation results were more frequent among women with incomplete or ectopic

pregnancies compared to those with threatened miscarriage.

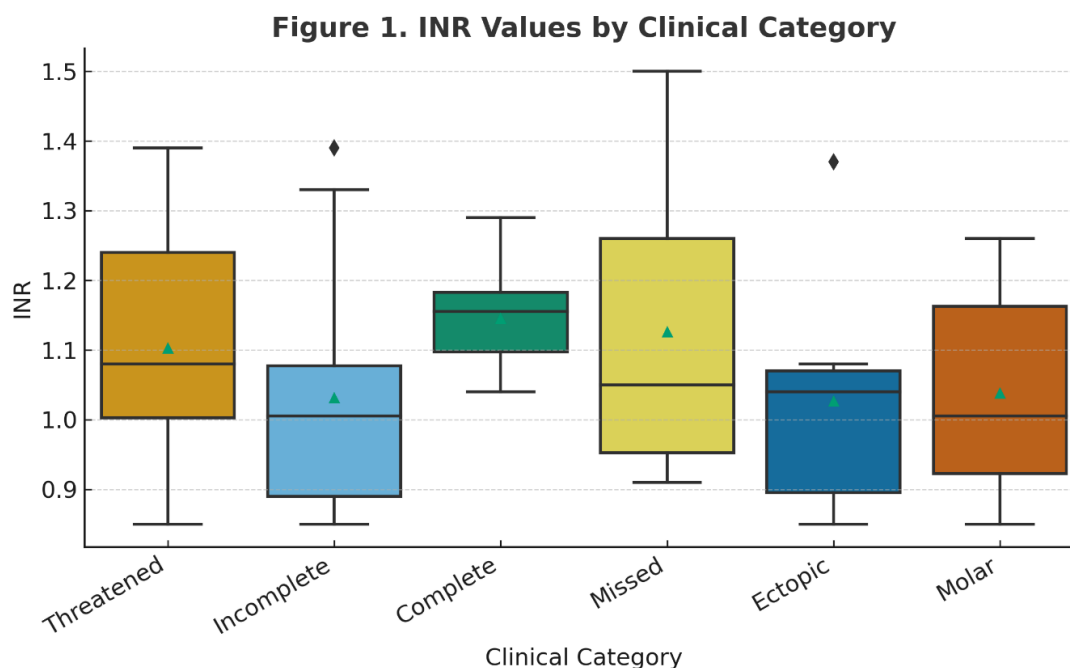


Figure 1: INR values by clinical category

Clinical Outcomes: Of the total cohort, 30 (31.6%) women required hospital admission, 11 (11.6%) received blood transfusions, and 3 (3.2%) required ICU care. The mean length of hospital stay was 2.6 ± 1.4 days. Women with abnormal coagulation

parameters (either prolonged PT, elevated INR, or thrombocytopenia) had significantly higher rates of admission and transfusion than those with normal results ($p < 0.05$).

Table 3: Association of coagulation abnormalities with clinical outcomes

Parameter	Admission (%)	Transfusion (%)
Normal PT	26.0	9.0
Abnormal PT	49.0	19.0
Normal INR	25.3	7.4
Abnormal INR	52.8	21.3
Normal Platelet count	27.0	8.2
Thrombocytopenia	55.6	22.2

Patients with both prolonged PT and thrombocytopenia had the highest likelihood of requiring transfusion and prolonged hospital stay. The association between abnormal INR and transfusion requirement was statistically significant ($p = 0.03$).

Discussion

Vaginal bleeding in the first trimester is among the most frequent obstetric emergencies encountered in clinical practice. Although many women experience minor bleeding that resolves spontaneously, some present with serious underlying conditions such as incomplete abortion, ectopic pregnancy, or gestational trophoblastic disease. These situations can progress rapidly to significant hemorrhage if not identified early. Evaluation of coagulation status is therefore an essential part of assessing such patients. The present study examined prothrombin time (PT), international normalized ratio (INR), and platelet

counts in women who presented with first-trimester vaginal bleeding and correlated these findings with their clinical outcomes.

In this study, conducted over a 12-month period at Government Medical College, Purnea, Bihar, 95 women with first-trimester bleeding were analyzed. Most of the women were young, with a mean age of 26 years, and the average gestational age at presentation was around nine weeks. The majority were multigravidae and unbooked cases, which reflects the reality of public hospital populations in this region. Threatened miscarriage was the most frequent presentation, followed by incomplete and complete abortions, while ectopic and molar pregnancies together comprised about 14% of cases. This distribution is consistent with the pattern reported from other tertiary centers in India and highlights the burden of early pregnancy complications in resource-limited settings.

Coagulation studies revealed that roughly one-quarter of the women had abnormalities in at least one parameter. About 26% showed prolonged PT, 22% had elevated INR values, and nearly 19% had reduced platelet counts. Although the mean values of PT and INR were only mildly raised, these deviations were clinically relevant, as they were associated with increased risk of admission, transfusion, and longer hospital stay. The findings indicate that even minor derangements in coagulation may accompany early pregnancy bleeding. These subtle abnormalities may reflect ongoing activation of the coagulation cascade caused by tissue injury at the implantation site or from trophoblastic necrosis in cases of abortion and molar pregnancy.

The relationship between abnormal coagulation tests and clinical outcomes was clear in this series. Women with raised INR or low platelet counts were significantly more likely to require hospitalization and blood transfusion. Those with INR above 1.2 had approximately double the admission rate and triple the transfusion rate compared with women whose results were within the normal range. Similar observations have been reported by earlier Indian and international studies, which found that deranged coagulation parameters correlate strongly with the severity of bleeding and the need for surgical management. In our cohort, ectopic and molar pregnancies accounted for most cases with markedly abnormal PT and INR, supporting the hypothesis that trophoblastic tissue injury and excessive release of thromboplastin contribute to consumption of clotting factors.

The results of this study have practical implications for patient management. In many hospitals, coagulation testing is not routinely performed for women with early pregnancy bleeding unless there is obvious heavy hemorrhage. However, this study shows that abnormal results can occur even in patients with apparently mild bleeding. Performing basic coagulation tests—PT, INR, and platelet count—at the time of admission is inexpensive and can help clinicians identify women at higher risk of complications. Early recognition of a prolonged PT or low platelet count allows for timely preparation of blood products and planning of medical or surgical intervention. Incorporating these tests into the standard evaluation protocol can enhance safety and reduce avoidable morbidity, particularly in centers where delays in transfusion support may prove critical.

The underlying physiological mechanisms further justify the inclusion of coagulation assessment. Pregnancy is a naturally hypercoagulable state characterized by increased clotting factor activity and reduced fibrinolysis, which protects against hemorrhage during delivery. However, when bleeding occurs in the first trimester, this protective

balance can be disrupted. Tissue breakdown releases thromboplastin into circulation, triggering widespread activation of coagulation factors and, in some cases, leading to their consumption. In trophoblastic disease, the excessive production of thromboplastin from degenerated villi may even precipitately disseminated intravascular coagulation. Similarly, rupture of an ectopic pregnancy can cause both localized and systemic coagulation disturbances. The derangements seen in our study likely represent early manifestations of these processes.

While the findings are in line with those of previous research, they also provide important data specific to the population served by our institution. The relatively high proportion of unbooked cases emphasizes the ongoing need for early antenatal registration and counseling about the importance of prompt evaluation for bleeding. Although this was a retrospective study with inherent limitations such as incomplete record documentation and absence of advanced coagulation markers, the results offer valuable insights into real-world clinical practice. The modest sample size limits generalization, but the consistent pattern of association between coagulation abnormalities and adverse outcomes lends weight to the observations. Future prospective studies with larger cohorts and inclusion of additional parameters such as fibrinogen and D-dimer could strengthen the evidence for routine coagulation screening in this setting.

Overall, the study demonstrates that derangements in PT, INR, and platelet counts are relatively common among women with first-trimester vaginal bleeding and are associated with worse clinical outcomes. Recognizing these abnormalities early can help in timely intervention and prevention of complications. Routine assessment of coagulation profile should therefore be considered part of the initial workup for all women presenting with early pregnancy bleeding, regardless of apparent severity. Implementing this simple measure in everyday obstetric practice could improve preparedness, optimize transfusion planning, and contribute to better maternal safety in both tertiary and peripheral care hospitals.

Conclusion

Abnormal PT, INR, and platelet counts were found in a notable proportion of women with early pregnancy bleeding and were associated with increased risk of hospital admission and transfusion. Routine coagulation assessment at initial presentation can serve as an important adjunct to clinical evaluation for anticipating complications and guiding management decisions.

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