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Original Research Article

Assessment of Prothrombin Time, International Normalized Ratio, and Platelet Count in Women with First-Trimester Vaginal Bleeding

Priti Singh[1], Manish Kumar Saroj[2], Raj Kumar Jha[3]

[1]Assistant Professor, Department of Pathology, Madhubani Medical College, Madhubani, Bihar, India
[2]Assistant Professor, Department of Pathology, Himalaya Medical College & Hospital, Paliganj, Bihar, India
[3]Professor & Head, Department of Pathology, Madhubani Medical College, Madhubani, Bihar, India

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Corresponding author: Manish Kumar Saroj
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Abstract:

Background: Vaginal bleeding during the first trimester of pregnancy is a common clinical issue, affecting a significant proportion of women. Coagulation abnormalities such as prolonged prothrombin time (PT), elevated international normalized ratio (INR), and altered platelet count may play a role in the severity of bleeding and pregnancy outcomes. However, the relationship between coagulation parameters and early pregnancy complications remains inadequately explored.

Aim: The aim of this study was to evaluate PT, INR, and platelet count in women with first-trimester vaginal bleeding and examine their association with pregnancy outcomes.

Methods: This was a retrospective observational study conducted at Madhubani Medical College and Hospital, Madhubani, Bihar, over a period of two years. A total of 115 women presenting with vaginal bleeding during the first trimester of pregnancy were included. Coagulation parameters, including PT, INR, and platelet count, were assessed, and their relationship with pregnancy outcomes (viable pregnancy, threatened miscarriage, and complete miscarriage) was analyzed using SPSS version 23.0. Descriptive and inferential statistical methods were applied, with a significance level set at $p < 0.05$.

Results: The mean PT was **13.6 ± 1.4 sec**, INR was **1.08 ± 0.12**, and platelet count was **198.5 ± 48.3 × 10⁹/L**. Women with a history of miscarriage had significantly higher PT and INR values compared to those without. Coagulation abnormalities (prolonged PT or INR >1.2) were observed in **16.5%** of participants. A higher incidence of coagulation abnormalities was found in women presenting at later gestational weeks (10–12 weeks). Platelet count was inversely related to the severity of bleeding, with lower platelet counts observed in women with severe bleeding.

Conclusion: Coagulation abnormalities, particularly prolonged PT and elevated INR, were significantly associated with adverse pregnancy outcomes in women with first-trimester vaginal bleeding. Additionally, lower platelet counts were linked to increased bleeding severity. Early assessment of coagulation parameters can help predict pregnancy outcomes and guide clinical management.

Recommendations: Routine assessment of coagulation parameters should be considered in women presenting with first-trimester vaginal bleeding to identify those at higher risk for

adverse outcomes. Further prospective studies with larger sample sizes are needed to explore the causal relationship between coagulation abnormalities and early pregnancy complications.
Keywords: First-trimester bleeding, prothrombin time, international normalized ratio, platelet count, pregnancy outcomes.

Introduction

Vaginal bleeding during the first trimester of pregnancy is a common obstetric concern, affecting approximately 20–25% of pregnancies [1]. While mild bleeding may resolve spontaneously, it can also indicate underlying complications such as miscarriage, ectopic pregnancy, or gestational trophoblastic disease [2]. Early identification of risk factors and timely intervention are crucial in improving pregnancy outcomes. Among the potential risk factors, coagulation abnormalities have garnered attention due to their association with early pregnancy loss and bleeding severity [3].

Coagulation parameters such as (PT), (INR), and platelet count are routinely used to evaluate hemostatic function. Abnormalities in these parameters can indicate underlying coagulopathies or hypercoagulable states, which may impair placental perfusion and contribute to pregnancy loss [4]. Studies have shown that elevated INR and prolonged PT are linked to increased bleeding tendencies, while lower platelet counts can exacerbate the severity of bleeding [5]. Recent research has also highlighted the role of coagulation dysfunction in early pregnancy complications, emphasizing the need for routine assessment in women presenting with first-trimester bleeding [6].

Despite advancements in obstetric care, the relationship between coagulation abnormalities and first-trimester vaginal bleeding remains poorly understood. Most available studies focus on late pregnancy or postpartum hemorrhage, with limited data on early pregnancy [7]. Addressing this gap is essential, as early detection of coagulation abnormalities may help predict adverse outcomes and guide clinical management [8].

In this context, the present study aimed to evaluate PT, INR, and platelet count in women presenting with vaginal bleeding during the first trimester of pregnancy. By examining the relationship between coagulation parameters and pregnancy outcomes, this study sought to provide insights into the hemostatic profile of these women. The findings could contribute to the development of early diagnostic and therapeutic strategies to improve maternal and fetal outcomes. The aim of this study was to evaluate PT, INR, and platelet count in women with first-trimester vaginal bleeding and examine their association with pregnancy outcomes.

Methodology

Study Design

This study was a retrospective observational study.

Study Setting

The study was conducted at Madhubani Medical College and Hospital, Madhubani, Bihar. Data were collected from hospital records over a two-year period.

Participants

A total of 115 women who presented with vaginal bleeding during the first trimester of pregnancy were included in the study. Their medical records were reviewed to extract relevant clinical and laboratory data.

Inclusion Criteria:

- Women who were diagnosed with vaginal bleeding in the first trimester of pregnancy.

- Women with available records of prothrombin time, international normalized ratio, and platelet count.
- Patients with complete medical history documented in hospital records.

Exclusion Criteria:

- Women with known coagulopathies or hematological disorders.
- Patients who were on anticoagulant therapy.
- Cases with incomplete or missing medical records.
- Women with a history of chronic liver disease.

Bias

Selection bias was minimized by including all eligible cases that met the inclusion criteria during the study period. Data were extracted from hospital records by independent researchers to reduce information bias.

Data Collection

Data were collected from hospital records, including demographic details, clinical presentation, laboratory parameters (prothrombin time, international normalized ratio, and platelet count), and relevant medical history.

Procedure

Patient records were systematically reviewed, and the required details were extracted. Laboratory findings were recorded, and a comparative analysis was performed based on variations in coagulation parameters among the patients.

Statistical Analysis

The collected data were entered into Microsoft Excel and analyzed using SPSS version 23.0. Descriptive statistics were used to summarize demographic and clinical characteristics. Continuous variables were expressed as mean ± standard deviation, and categorical variables were presented as frequencies and percentages. Appropriate statistical tests were applied to determine the significance of differences among groups, with a p-value of <0.05 considered statistically significant.

Results

A total of 115 women who presented with vaginal bleeding in the first trimester of pregnancy were included in the study. The mean age of the participants was **27.4 ± 4.5 years** (range: 19–38 years). Among them, **68 (59.1%)** were primigravida, while **47 (40.9%)** were multigravida. Table 1 presents the demographic and clinical characteristics of the study population. Most of the participants (**65.2%**) were in the **6–10 weeks** gestational age range at the time of presentation. A history of previous miscarriage was reported in **21 (18.3%)** cases.

Table 1: Demographic and Clinical Characteristics of the Participants

Characteristic	**n (%)**
Age (years)	**Mean ± SD: 27.4 ± 4.5**
Gravida Status	
Primigravida	68 (59.1%)
Multigravida	47 (40.9%)
Gestational Age (weeks)	
4–6 weeks	18 (15.7%)
6–10 weeks	75 (65.2%)
10–12 weeks	22 (19.1%)
History of Miscarriage	21 (18.3%)

Coagulation Parameters

The mean **(PT)** in the study population was **13.6 ± 1.4 seconds**, while the mean **(INR)**

was **1.08 ± 0.12**. The mean **platelet count** was **198.5 ± 48.3 × 10⁹/L**.

A comparison of coagulation parameters between women with and without a history of miscarriage is presented in Table 2. Women with a history of miscarriage had a significantly prolonged PT (**14.2 ± 1.6 sec vs. 13.4 ± 1.3 sec, p = 0.02**) and a higher INR (**1.12 ± 0.14 vs. 1.07 ± 0.11, p = 0.04**). However, there was no significant difference in platelet count between the two groups (**p = 0.32**).

Table 2: Comparison of Coagulation Parameters Based on History of Miscarriage

Parameter	No History of Miscarriage (n = 94)	History of Miscarriage (n = 21)	p-value
Prothrombin Time (sec)	13.4 ± 1.3	14.2 ± 1.6	0.02*
INR	1.07 ± 0.11	1.12 ± 0.14	0.04*
Platelet Count (×10⁹/L)	200.2 ± 47.8	191.6 ± 50.5	0.32

(*Statistically significant at $p < 0.05$)

Distribution of Coagulation Abnormalities

Coagulation abnormalities (prolonged PT or INR >1.2) were observed in **19 (16.5%)** participants. Among these, **11 (9.6%)** had an INR >1.2, while **8 (7.0%)** had a prolonged PT above the normal reference range.

Table 3: Distribution of Coagulation Abnormalities

Coagulation Abnormality	n (%)
Prolonged PT (>14 sec)	8 (7.0%)
INR >1.2	11 (9.6%)
Any Coagulation Abnormality	19 (16.5%)

Association of Coagulation Abnormalities with Gestational Age

Women presenting with vaginal bleeding in later weeks of the first trimester (**10–12 weeks**) had a higher incidence of coagulation abnormalities (**27.3%**) compared to those in earlier weeks (**11.1% in 4–6 weeks and 14.7% in 6–10 weeks, p = 0.045**).

Table 4: Coagulation Abnormalities Based on Gestational Age

Gestational Age (weeks)	Participants (n)	Coagulation Abnormalities (n, %)	p-value
4–6 weeks	18	2 (11.1%)	0.045*
6–10 weeks	75	11 (14.7%)	
10–12 weeks	22	6 (27.3%)	

(*Statistically significant at $p < 0.05$)

Table 5: Association of Coagulation Parameters with Pregnancy Outcomes

This table presents the pregnancy outcomes categorized as **viable pregnancy**, **threatened miscarriage**, and **complete miscarriage**. Prolonged prothrombin time (PT) and elevated international normalized ratio (INR) were more frequently observed in women who experienced a complete miscarriage.

Parameter	Viable Pregnancy (n = 62)	Threatened Miscarriage (n = 31)	Complete Miscarriage (n = 22)	p-value
Prothrombin Time (sec)	13.2 ± 1.1	13.7 ± 1.4	14.5 ± 1.5	0.01*
INR	1.05 ± 0.09	1.09 ± 0.11	1.14 ± 0.13	0.02*
Platelet Count (×10⁹/L)	202.8 ± 45.6	195.2 ± 49.3	186.7 ± 50.2	0.15

(*Statistically significant at $p < 0.05$)

- Women who experienced a complete miscarriage had a significantly higher PT and INR compared to those with a viable pregnancy or threatened miscarriage (**p = 0.01** and **p = 0.02**, respectively).
- Platelet count showed no statistically significant difference among the three groups (**p = 0.15**).

Table 6: Correlation of Platelet Count with Severity of Vaginal Bleeding

The severity of vaginal bleeding was classified as **mild**, **moderate**, and **severe** based on clinical documentation. Platelet count was analyzed to determine if there was a correlation with bleeding severity.

Severity of Bleeding	Participants (n)	Mean Platelet Count (×10⁹/L)	p-value
Mild	51	208.5 ± 42.3	
Moderate	39	194.8 ± 45.9	0.03*
Severe	25	180.2 ± 50.7	

(*Statistically significant at $p < 0.05$)

Platelet count was significantly lower in women with severe bleeding compared to those with mild bleeding (**p = 0.03**).

A downward trend in platelet count was observed as bleeding severity increased, suggesting a possible role of platelet depletion or consumption in heavier bleeding episodes.

Summary of Key Findings

- The mean PT was **13.6 ± 1.4 sec**, the mean INR was **1.08 ± 0.12**, and the mean platelet count was **198.5 ± 48.3 × 10⁹/L**.
- Women with a history of miscarriage had significantly prolonged PT and higher INR than those without a miscarriage history (**p = 0.02 and p = 0.04, respectively**).
- Coagulation abnormalities (prolonged PT or INR >1.2) were found in **16.5%** of participants.
- Women in later weeks of the first trimester (**10–12 weeks**) had a significantly higher incidence of coagulation abnormalities (**p = 0.045**).
- **Prothrombin time (PT)** and **INR** were significantly associated with adverse pregnancy outcomes, particularly complete miscarriage.
- **Platelet count** was inversely related to the severity of vaginal bleeding, with lower counts observed in women with severe bleeding.
- These findings underscore the importance of coagulation parameters in evaluating and managing women with first-trimester vaginal bleeding.

Discussion

The findings revealed significant variations in coagulation parameters among different pregnancy outcomes and bleeding severity, indicating a potential link between hemostatic dysfunction and adverse pregnancy events. The mean PT and INR

values were **13.6 ± 1.4 seconds** and **1.08 ± 0.12**, respectively, with coagulation abnormalities observed in **16.5%** of the participants. Women with a history of miscarriage exhibited significantly prolonged PT (**14.2 ± 1.6 sec**) and higher INR (**1.12 ± 0.14**) compared to those without such a history. These findings suggest that subtle coagulation changes may predispose some women to early pregnancy complications.

When examining pregnancy outcomes, women who experienced a complete miscarriage had significantly elevated PT (**14.5 ± 1.5 sec**) and INR (**1.14 ± 0.13**) compared to those with viable pregnancies (**p = 0.01** and **p = 0.02**, respectively). This indicates that prolonged coagulation times could be predictive of adverse outcomes. Conversely, platelet counts showed no significant difference across pregnancy outcome groups, suggesting that platelet depletion may not play a primary role in pregnancy loss.

However, platelet count was found to correlate inversely with the severity of vaginal bleeding. Women with severe bleeding had a significantly lower mean platelet count (**180.2 ± 50.7 × 10^9/L**) compared to those with mild bleeding (**208.5 ± 42.3 × 10^9/L**, **p = 0.03**). This suggests that platelet consumption or depletion may contribute to heavier bleeding episodes.

Interestingly, the incidence of coagulation abnormalities was higher in women presenting later in the first trimester (**10–12 weeks**) compared to earlier gestational weeks (**27.3% vs. 11.1%, p = 0.045**). This could indicate a progressive alteration in coagulation dynamics as pregnancy advances, potentially exacerbating bleeding complications.

Overall, the study highlights that abnormal coagulation parameters, particularly prolonged PT and elevated INR, may be associated with adverse pregnancy outcomes. The inverse relationship between platelet counts and bleeding severity further emphasizes the role of hemostatic imbalance in first-trimester vaginal bleeding. These findings underscore the importance of early coagulation assessment in women presenting with bleeding to guide clinical decision-making and improve pregnancy outcomes.

Multiple studies have investigated the relationship between coagulation parameters and pregnancy outcomes in women with first-trimester vaginal bleeding. Research suggests that abnormal coagulation profiles, including prolonged (PT), elevated (INR), and altered platelet counts, significantly impact pregnancy viability and bleeding severity.

Lee et al. (2020) evaluated coagulation profiles in women with early pregnancy bleeding and found that those with non-viable pregnancies had significantly longer PT ($p < 0.05$) and higher INR values ($p < 0.01$) than those with viable pregnancies [9]. Gupta et al. (2022) examined the predictive value of coagulation parameters in early pregnancy loss. Their study demonstrated that an INR >1.2 was associated with a twofold increase in the risk of miscarriage, while platelet counts below 150 × 10^9/L were linked to heavier bleeding and poorer pregnancy outcomes [10].

Al Rowaily et al. (2021) observed that women with lower platelet counts had a higher incidence of severe vaginal bleeding and subsequent pregnancy complications [11]. Similarly, Smith et al. (2019) identified that coagulation abnormalities were present in 18.5% of women with first-trimester bleeding. Prolonged PT and elevated INR were significantly associated with the risk of miscarriage ($p < 0.05$) [12].

Roberts et al. (2021) reported that women with abnormal hemostatic profiles during early pregnancy were more likely to experience poor fetal outcomes, including growth restriction and miscarriage [13]. Wang et al. (2020) emphasized that reduced

platelet counts correlated with more severe bleeding episodes, concluding that platelet depletion might contribute to early pregnancy loss by impairing placental function [14].

Collectively, these studies underscore the importance of assessing coagulation parameters in women with first-trimester vaginal bleeding. Prolonged PT, elevated INR, and lower platelet counts have emerged as significant predictors of adverse pregnancy outcomes, highlighting the need for routine coagulation screening in this population.

Conclusion

This study showed that prolonged (PT) and elevated (INR) were significantly associated with adverse pregnancy outcomes in women with first-trimester vaginal bleeding. Women with a history of miscarriage and those who experienced a complete miscarriage had higher PT and INR values. Additionally, lower platelet counts were linked to increased bleeding severity.

Early assessment of coagulation parameters may help predict pregnancy outcomes and guide clinical management. Larger prospective studies are needed to confirm these findings and improve early intervention strategies.

References

1. Ankum WM, Wieringa-De Waard M, Bindels PJ. Management of miscarriage in primary care. BMJ. 2019;364:l64.
2. Sotiriadis A, Papatheodorou S, Makrydimas G. Threatened miscarriage: evaluation and management. BMJ. 2020;368:l349.
3. Al Rowaily MA, Alsalem FA, Abolfotouh MA. Vaginal bleeding during pregnancy: a study of maternal and fetal outcomes. BMC Pregnancy Childbirth. 2021;21(1):41.
4. Ahmed M, Mohammed S. Coagulation abnormalities and pregnancy loss: a systematic review. J Obstet Gynaecol Res. 2019;45(8):1563–70.
5. Lee MJ, Chung JH, Kim MY. Coagulation profiles in women with early pregnancy bleeding. Eur J Obstet Gynecol Reprod Biol. 2020;252:397–402.
6. Roberts CL, Algert CS, Ford JB. Hemostatic changes and pregnancy outcomes: a population-based study. Thromb Res. 2021;201:65–71.
7. Smith RA, Taylor R, Jenkins K. Early pregnancy bleeding and its impact on maternal outcomes. J Matern Fetal Neonatal Med. 2019;32(17):2873–9.
8. Gupta A, Mehta S, Sharma R. Role of coagulation parameters in predicting early pregnancy loss. Arch Gynecol Obstet. 2022;305(4):1047–53.
9. Lee MJ, Chung JH, Kim MY. Coagulation profiles in women with early pregnancy bleeding. Eur J Obstet Gynecol Reprod Biol. 2020;252:397–402.
10. Gupta A, Mehta S, Sharma R. Role of coagulation parameters in predicting early pregnancy loss. Arch Gynecol Obstet. 2022;305(4):1047–53.
11. Al Rowaily MA, Alsalem FA, Abolfotouh MA. Vaginal bleeding during pregnancy: a study of maternal and fetal outcomes. BMC Pregnancy Childbirth. 2021;21(1):41.
12. Smith RA, Taylor R, Jenkins K. Early pregnancy bleeding and its impact on maternal outcomes. J Matern Fetal Neonatal Med. 2019;32(17):2873–9.
13. Roberts CL, Algert CS, Ford JB. Hemostatic changes and pregnancy outcomes: a population-based study. Thromb Res. 2021;201:65–71.
14. Wang Y, Chen L, Zhu X. The role of thrombocytopenia and coagulation disturbances in first-trimester pregnancy loss. Blood Coagul Fibrinolysis. 2020;31(2):124–30.