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Maternal and Fetal Outcomes in Pregnancies Complicated by First-Trimester Vaginal Bleeding – A Cross-Sectional Study

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ABSTRACT

Background: First-trimester vaginal bleeding is a frequent obstetric presentation often associated with anxiety regarding pregnancy viability. Emerging evidence suggests that early pregnancy bleeding may have lasting implications for both maternal and fetal health beyond the first trimester. This study aimed to evaluate maternal and fetal outcomes in pregnancies complicated by first-trimester vaginal bleeding. **Methods:** This cross-sectional observational study was conducted at the Department of Obstetrics and Gynecology, Bangladesh Medical University, Dhaka, from July 2024 to June 2025. A total of 120 pregnant women with vaginal bleeding at ≤12 weeks of gestation were enrolled. Participants were followed up until pregnancy outcomes were determined. Maternal complications and fetal–neonatal outcomes were documented. Data were analyzed using SPSS version 25.0. **Results:** Miscarriage before 20 weeks occurred in 23.3% of cases. Among the ongoing pregnancies, 52.5% resulted in term deliveries and 24.2% were preterm. Pregnancy-induced hypertension (11.7%) and gestational diabetes mellitus (9.2%) were the most common complications. Low birth weight was observed in 29.3% of neonates, NICU admission in 22.8%, low Apgar score in 14.1% and stillbirth in 5.4% of the cases. **Conclusion:** First-trimester vaginal bleeding is associated with an increased risk of adverse maternal and fetal outcomes. Pregnancy complicated by early bleeding requires close antenatal monitoring to improve the perinatal outcomes.

Keywords: *First-trimester bleeding, threatened miscarriage, pregnancy outcomes, preterm birth, neonatal outcomes.*

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Introduction

First-trimester vaginal bleeding is a common obstetric presentation, affecting approximately 20–30% of clinically recognized pregnancies and representing a major source of anxiety for pregnant women and clinicians [1]. Although many pregnancies continue uneventfully, early pregnancy bleeding has been associated with an increased risk of adverse maternal and fetal outcomes, including miscarriage, preterm birth, hypertensive disorders and low birth weight [2]. The clinical significance of first-trimester bleeding varies widely depending on gestational age, severity of bleeding and underlying etiology.

Threatened miscarriage, defined as vaginal bleeding before 20 weeks of gestation with a closed cervical os and a viable fetus, constitutes the most frequent diagnosis among women presenting with early pregnancy bleeding [3]. Previous studies have demonstrated that even when pregnancy continues beyond the first trimester, these women remain at higher risk of complications later in pregnancy [4]. Edwards et al. reported that characteristics of first-trimester bleeding were independently associated with an increased risk of preterm birth [5]. Similarly, Lykke et al. observed higher rates of placental complications and hypertensive disorders among women with early pregnancy bleeding [6].

The pathophysiological mechanisms linking first-trimester bleeding to adverse outcomes are not fully understood. Abnormal placentation, subchorionic hematoma and impaired trophoblastic invasion have been proposed as potential mechanisms contributing to placental insufficiency and subsequent pregnancy complications [7]. Al-Memar et al. highlighted the association between first-trimester intrauterine hematoma and later pregnancy complications, emphasizing the importance of early placental development [8]. These placental abnormalities may predispose affected pregnancies to fetal growth restriction, preeclampsia and preterm delivery.

Several studies from different populations have examined maternal and perinatal outcomes following first-trimester vaginal bleeding, with varying results [9,10]. Differences in study design, population characteristics and healthcare settings contribute to this variability. In low- and middle-income countries, where access to early antenatal care and diagnostic facilities may be limited, the burden of adverse outcomes associated with early pregnancy bleeding may be greater [11]. However, data from South Asian settings, particularly Bangladesh, remain limited.

Understanding the pattern of maternal and fetal outcomes among women presenting with first-trimester vaginal bleeding is essential for risk stratification, counseling and targeted antenatal surveillance. Identifying the proportion of pregnancies that result in miscarriage, preterm delivery and neonatal complications can help clinicians optimize follow-up and management strategies. Therefore, this study aimed to evaluate maternal and fetal outcomes in pregnancies complicated by first-trimester vaginal bleeding in a tertiary care hospital in Bangladesh, thereby addressing an important gap in regional evidence and contributing to improved clinical decision-making.

Objectives

The objective of this study was to evaluate maternal and fetal outcomes in pregnancies complicated by first-trimester vaginal bleeding.

Methods & Materials

This cross-sectional observational study was conducted in the Department of Obstetrics and Gynecology, Bangladesh Medical University (BMU), Dhaka, Bangladesh, from July 2024 to June 2025. A total of 120 pregnant women presenting with first-trimester vaginal bleeding were included.

Sample Selection

Inclusion criteria:

- Pregnant women with confirmed intrauterine pregnancy.
- Gestational age ≤12 weeks at presentation.
- History of vaginal bleeding during the first trimester.
- Willingness to provide informed written consent.

Exclusion criteria:

- Ectopic or molar pregnancy.
- Induced abortion or traumatic bleeding.
- Known chronic medical disorders predating pregnancy.
- Incomplete clinical records or refusal to participate.

Data Collection Procedure

Data collection was carried out using a structured and pretested data collection sheet developed specifically for the study. Eligible participants were recruited consecutively from inpatient and outpatient services after confirmation of first-trimester vaginal bleeding by clinical assessment and ultrasonography. Baseline socio-demographic and obstetric variables, including maternal age, parity, gestational age at bleeding and severity of bleeding, were recorded through face-to-face interviews and review of medical records. Clinical evaluation was supported by ultrasonographic findings to confirm fetal viability and gestational age. Participants were followed prospectively until pregnancy outcome and information on miscarriage, gestational age at delivery, maternal complications and fetal or neonatal outcomes was documented. Maternal complications such as pregnancy-induced hypertension, gestational diabetes mellitus, placental abruption and premature rupture of membranes were diagnosed based on standard clinical and laboratory criteria. Neonatal outcomes including birth weight, Apgar score, NICU admission and stillbirth, were recorded immediately after delivery. Data accuracy and consistency were ensured through regular cross-checking of records and supervision by the principal investigator. Informed consent was obtained from all participants before enrollment and confidentiality of personal information was strictly maintained throughout the study.

Statistical Analysis

Data were entered and analyzed using SPSS version 25.0. Descriptive statistics, including frequencies and percentages, were used to summarize maternal characteristics, pregnancy outcomes and complications. Results were presented in tabular form to facilitate clarity and comparison.

Results

Table I presents the baseline maternal characteristics of the 120 study participants. Most women were aged 25–29 years (38.3%), followed by 18–24 years (35.0%) and ≥30 years (26.7%). Parity distribution was nearly equal, with primigravida accounting for 48.3% and multigravida for 51.7%. Vaginal bleeding occurred more frequently between 9–12 weeks of gestation (55.0%) than at ≤8 weeks (45.0%). Regarding severity, spotting was the most common presentation (40.8%), followed by moderate bleeding (37.5%) and heavy bleeding (21.7%).

Table I
Baseline Maternal Characteristics of Study Participants (*n* = 120).

Variable		Frequency (n)	Percentage (%)
Maternal age (years)	18–24	42	35.0
	25–29	46	38.3
	≥30	32	26.7
Parity	Primigravida	58	48.3
	Multigravida	62	51.7
Gestational age at bleeding	≤8 weeks	54	45.0
	9–12 weeks	66	55.0
Severity of bleeding	Spotting	49	40.8
	Moderate bleeding	45	37.5
	Heavy bleeding	26	21.7

Table II describes pregnancy outcomes following first-trimester vaginal bleeding. Miscarriage before 20 weeks occurred in 23.3% of cases, while 76.7% progressed beyond 20 weeks of gestation. Among the 92 ongoing pregnancies, term delivery at or beyond 37 weeks was observed in 52.5%, whereas preterm delivery occurred in 24.2%.

Table II
Pregnancy Outcomes Following First-Trimester Vaginal Bleeding (*n* = 120).

Pregnancy outcome	Frequency (n)	Percentage (%)
Miscarriage (<20 weeks)	28	23.3
Ongoing pregnancy ≥20 weeks	92	76.7
Among ongoing pregnancies (n = 92)		
Term delivery (≥37 weeks)	63	52.5
Preterm delivery (<37 weeks)	29	24.2

Table III outlines maternal complications among ongoing pregnancies. Pregnancy-induced hypertension was reported in 11.7% of cases, gestational diabetes mellitus in 9.2%, premature rupture of membranes in 7.5% and placental abruption in 5.0%. No major maternal complication was observed in 43.3% of women.

Table III
Maternal Complications in Ongoing Pregnancies (*n* = 92).

Maternal complication	Frequency (n)	Percentage (%)
Pregnancy-induced hypertension	14	11.7
Gestational diabetes mellitus	11	9.2
Placental abruption	6	5.0
Premature rupture of membranes	9	7.5
No major complication	52	43.3

Table IV presents fetal and neonatal outcomes among live births. Low birth weight affected 29.3% of neonates and 22.8% required NICU admission. A low Apgar score at 5 minutes was observed in 14.1%, while stillbirth occurred in 5.4%. Normal neonatal outcomes were documented in 53.3% of cases.

Table IV
Fetal and Neonatal Outcomes Among Live Births (*n* = 92).

Neonatal outcome	Frequency (n)	Percentage (%)
Low birth weight (<2500 g)	27	29.3
NICU admission	21	22.8
Low Apgar score (<7 at 5 min)	13	14.1
Stillbirth	5	5.4
Normal neonatal outcome	49	53.3

Discussion

The present study evaluated maternal and fetal outcomes in pregnancies complicated by first-trimester vaginal bleeding and demonstrated that nearly one-quarter of affected pregnancies resulted in miscarriage, while a substantial proportion of ongoing pregnancies were associated with preterm birth, maternal complications and adverse neonatal outcomes. These findings reinforce the clinical relevance of early pregnancy bleeding as a marker of heightened obstetric risk.

The miscarriage rate of 23.3% observed in this study is consistent with findings reported by Amirkhani et al., who documented a significantly increased risk of pregnancy loss among women presenting with first-trimester vaginal bleeding [9]. Similar miscarriage proportions have been reported in hospital-based studies from South Asia, suggesting that early bleeding reflects underlying placental or embryonic compromise rather than being a benign event [12]. The persistence of pregnancy beyond the first trimester, however, does not necessarily confer a favorable prognosis, as demonstrated by the high burden of complications among ongoing pregnancies in the present cohort.

Preterm delivery occurred in 24.2% of ongoing pregnancies, highlighting a strong association between early bleeding and shortened gestation. Hackney and Glantz demonstrated through systematic analysis that vaginal bleeding in early pregnancy significantly increases the risk of preterm birth, independent of other maternal factors [13]. The proposed mechanism involves abnormal placentation and chronic inflammatory changes initiated early in gestation, which may predispose to premature activation of parturition pathways. Edwards et al. similarly reported that heavier and recurrent bleeding episodes were particularly predictive of preterm birth, underscoring the prognostic value of bleeding severity [5].

Maternal complications were frequently observed in the present study, with pregnancy-induced hypertension and gestational diabetes mellitus being the most common. Guruvare et al. reported comparable rates of hypertensive disorders among women with threatened miscarriage, attributing this association to defective trophoblastic invasion and impaired spiral artery remodeling [14]. These placental abnormalities may result in endothelial dysfunction, thereby increasing susceptibility to hypertensive disorders later in pregnancy. The occurrence of placental abruption, although less frequent, further supports the hypothesis of placental insufficiency as a unifying pathophysiological pathway.

Adverse fetal and neonatal outcomes were prominent in this cohort, particularly low birth weight and NICU admission. Bever et al. demonstrated altered fetal growth trajectories in pregnancies complicated by first-trimester bleeding, with increased risks of growth restriction and low birth weight at delivery [15]. Reduced placental perfusion and chronic hypoxia have been suggested as key contributors to impaired fetal growth in these pregnancies. The observed NICU admission rate of 22.8% in the present study aligns with findings from John et al., who reported increased neonatal morbidity among infants born to mothers with early pregnancy bleeding [3].

The stillbirth rate of 5.4% among live births is clinically significant and warrants attention. Kanmaz et al. reported that pregnancies complicated by threatened abortion had higher rates of late fetal loss compared with uncomplicated pregnancies, even after adjustment for confounders [16]. This emphasizes the need for vigilant antenatal surveillance in this high-risk group. Additionally, the proportion of neonates with low Apgar scores suggests increased perinatal compromise, possibly related to preterm delivery and placental dysfunction.

Severity and timing of bleeding may further modify pregnancy outcomes. Studies by Jakhetiya et al. and Rai et al. have shown that heavier bleeding and bleeding occurring later in the first trimester are associated with worse maternal and fetal outcomes [17,18]. In the present study, more than half of the women experienced bleeding between 9 and 12 weeks of gestation, a period critical for placental development, which may partly explain the observed complication rates.

Overall, the findings of this study are consistent with existing literature indicating that first-trimester vaginal bleeding is not merely an early gestational event but a significant predictor of adverse outcomes throughout pregnancy. Recognition of this association is essential for clinicians to ensure appropriate counseling, closer antenatal monitoring and timely intervention to mitigate preventable maternal and neonatal morbidity.

Conclusion

First-trimester vaginal bleeding is associated with a substantial risk of miscarriage, preterm delivery, maternal

complications and adverse neonatal outcomes. Even when pregnancy progresses beyond early gestation, women remain vulnerable to placental and perinatal complications. Early identification and intensified antenatal surveillance of affected pregnancies are essential for improving maternal and fetal outcomes in clinical practice.

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Conflicts of interest: There are no conflicts of interest.

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