



Original Research Article

Evaluation of Maternal and Perinatal Outcomes in Pregnant Females with Vaginal Bleeding During First Trimester

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Abstract: Background: Vaginal bleeding during the first trimester is an obstetric complication that is frequently encountered and that could predispose women to poor maternal and perinatal outcomes.

Objective: To evaluate the frequency of maternal and perinatal outcomes and their association with vaginal bleeding during the first trimester of pregnancy among pregnant females. **Methods:** A prospective cohort study, done at the Department of Obstetrics and Gynecology, Unit I, Civil Hospital Karachi Dow University of Health Sciences Karachi, Pakistan. 106 pregnant women aged between 20 - 40 years were recruited including 53 with bleeding episode in 1st trimester (exposed) and 53 without bleeding (unexposed). They were trailed until delivery with maternal outcomes (preeclampsia, preterm premature rupture of membranes, placental abruption, placenta previa, and intrauterine growth restriction) and perinatal outcomes being documented. Data analysis was done using the SPSS v26. P < 0.05 was taken to be significant. **Results:** Groups were similar in terms of baseline characteristics. The unexposed group reported much greater incidences of placenta abruption (13.2% vs. 1.9%, p=0.03), intrauterine growth restriction (20.8% vs. 7.5%, p=0.04), preterm birth (34.0% vs. 11.3%, p=0.006), and admission to the NICU (30.2% vs. 9.4%, p=0.008). Exposed neonates had lower birth weights and lower APGAR scores. The assumption of multivariate analysis proved that first-trimester bleeding was an independent risk factor that preterm birth (adjusted RR 2.72), IUGR (adjusted RR 2.48), and NICU hospitalization (adjusted RR 2.89). **Conclusion:** Early pregnancy vaginal bleeding is linked with poor maternal and infant outcomes. Pregnancies should be closely monitored as at an early age to enhance positive pregnancy outcomes.

Keywords: First-trimester bleeding; IUGR; Maternal outcomes; Perinatal outcomes; Preterm delivery.

INTRODUCTION

Early pregnancy vaginal bleeding is a frequent obstetric complication, reported in 20 -25% of known pregnancies and is a leading source of maternal anxiety and emergency visits in the first trimester of pregnancy. It is linked to a continuum of effects such as a viable continuing pregnancy, miscarriage, ectopic pregnancy and molar gestation. Furthermore, despite the continuation of pregnancy, premature bleeding has been associated with unfavorable maternal and neonatal outcomes [1].

In Pakistan, a number of studies done in hospitals have claimed that women who come in with bleeding in early pregnancy have recorded elevated frequencies of spontaneous abortions, early labor and reduced birth weight to women who do not experience the bleeding [2]. Recent global statistics also reveal that bleeding in the first trimester is not a one-time affair but might be caused by placental pathology, which leads to subsequent obstetric disasters [3].

European cohort studies also reveal that patients who bleed during early pregnancy are in high risk of placenta abruptions, untimely membrane rupture as well as intrauterine growth retardation, which underscores the importance of placing high level of antenatal surveillance [4]. On the same note, multicenter studies have highlighted the correlation between the effects of first-trimester bleeding on fetal health and neonatal complications [5].

Retrospective observational studies have also revealed the severity and length of bleeding episodes could be associated with the extent of adverse events especially the miscarriage and high blood pressure pregnancy disorders [6]. The prognostic importance of first-trimester bleeding has recently been affirmed by a systematic review and meta-analysis, which has shown that this type of bleeding is a significant risk factor leading to premature birth, small-for-gestational-age neonates, and perinatal mortality [7].

Evidence of probability to have cesarean section, antepartum blood loss, and neonatal intensive care unit has also been established in cohort studies across various populations, as a result of early bleeding during pregnancy [8]. Other studies within the region have reported greater rates of miscarriage and poor neonatal outcomes with such pregnancies than with controls [9].

In resource-constrained settings, vaginal bleeding during the first trimester has been linked to unfavorable pregnancy outcomes, such as preterm birth and low birthweight, according to data from tertiary care centers in Karachi [10]. However, differences in study design, population

characteristics, and healthcare contexts underscore the need for further research on maternal and neonatal outcomes in women presenting with early pregnancy bleeding. Therefore, this study was conducted to assess the impact of first-trimester vaginal bleeding on maternal and perinatal outcomes within our local population.

METHODS

The study was a prospective cohort study that was done in the Department of Obstetrics and Gynecology, Unit I, Civil Hospital Karachi Dow University of Health Sciences Karachi, Pakistan. This research was conducted in a duration of Three months from 6th June 2025- 29th September 2025, following the consent of the synopsis of the research by the College of Physicians and Surgeons Pakistan (CPSP). Pregnant women got enrolled and observed until delivery to ascertain maternal and perinatal outcomes with respect to first-trimester vaginal bleeding.

Two proportions were compared using the Open Epi software to calculate the sample size. Considering the proportions of preterm delivery of 37% and 12% reported previously [2]. in the exposed and unexposed groups, respectively, with a power of 80%, a confidence level of 95% and two-sided test, the estimated sample size per group was 53 participants. This resulted in the selection of 106 pregnant females consisting of 53 exposed group and 53 unexposed group. In the recruitment method, non-probability consecutive sampling technique was employed.

The study was restricted to pregnant females between the ages of 20 and 40 years. Exposed group comprised of women who bled during the first trimester of pregnancy i.e. bleeding before the end of 12 weeks of gestation and a certified physician. The control group was composed of pregnant women who have never experienced vaginal bleeding in their first trimester. All women who had chronic medical conditions like diabetes mellitus and blood pressure, had a history of infertility, underwent anticoagulant therapy, had twin or multiple pregnancies and those with known fetal congenital anomalies diagnosed on nuchal translucency screening were excluded in the study.

Written informed consent was then taken, and the eligible participants were recruited in the outpatient department or emergency department and classified as exposed and unexposed groups. First-trimester bleeding was also further categorized as light (bleeding only), or heavy (bleeding equal or greater than menstrual flow) in the exposed group. The details about gestational age at the moment of bleeding, bleeding episodes frequency, and duration,

and related symptoms, including abdominal pain or cramping, were observed. Both samples were prospectively trailed up to birth. The maternal outcome measures such as preeclampsia, preterm premature membrane rupture, placenta abruption, placenta previa and intrauterine growth restriction were observed during pregnancy and delivery. Birth-related outcomes were measured at birth (perinatal outcomes, such as preterm birth, low birth weight, neonatal morbidity, NICU hospitalization, congenital defects, and fatal outcomes during the first seven days). The diagnosis in all the cases was done by clinical examination, ultrasonography and related laboratory tests. A pre-structured pro forma was used to record data in order to come up with uniform and accurate data.

The data were processed with the SPSS version 26 (IBM, USA). Frequencies and percentages were used to show qualitative variables. Mean $\pm$ standard deviation was used to represent the quantitative variables, which include maternal age, gestational

age at delivery, birth weight, and Apgar scores were summarized using mean $\pm$ standard deviation for normally distributed data, and median with interquartile range for non-normally distributed data. The Shapiro- Wilk test was used to test normalcy. The chi-square or Fisher exact test, as applicable was used to compare the exposed and unexposed groups with respect to categorical variables. To determine the strength of association, relative risk with 95% confidence intervals was determined. In quantitative variables, the suitable comparative tests were used based on the data distribution. Stratification and multivariate logistic regression analysis was done to adjust potential effect modifiers, such as age of the women who gave birth, gestation age, socioeconomic status, parity, abortion history, history of vaginal bleeding and smoking or tobacco use, and comorbidities. Adjusted relative risks and 95% confidence interval were calculated. Any p-value below 0.05 was thought to be statistically significant.

RESULTS

A total of 106 pregnant females were included in the study, comprising 53 in the exposed group (occurrence of first-trimester vaginal bleeding) and 53 in the unexposed group.

Table I compares the baseline demographic and obstetric variables between the exposed and unexposed groups. The mean maternal age was comparable in both groups. There was no statistically significant difference regarding gestational age at admission, gravidity, parity, socioeconomic status, previous abortions, smoking exposure, or pre-existing comorbidities ($p > 0.05$). This indicates that both groups were comparable at baseline.

Table I. Baseline Demographic and Obstetric Characteristics (n=106)

Variable	Exposed (n=53)	Unexposed (n=53)	p-value
Maternal Age (years), Mean $\pm$ SD	27.8 $\pm$ 4.6	28.3 $\pm$ 5.1	0.58
Gestational Age at Admission (weeks), Mean $\pm$ SD	9.6 $\pm$ 1.8	9.8 $\pm$ 1.5	0.49
Gravidity ≥ 2 , n (%)	31 (58.5%)	29 (54.7%)	0.69
Parity ≥ 1 , n (%)	28 (52.8%)	26 (49.1%)	0.71
Previous Abortions, n (%)	14 (26.4%)	11 (20.8%)	0.49
Low Socioeconomic Status, n (%)	30 (56.6%)	28 (52.8%)	0.70
Smoking/Passive Exposure, n (%)	10 (18.9%)	8 (15.1%)	0.60
Any Comorbidity (DM/HTN), n (%)	9 (17.0%)	7 (13.2%)	0.58

Table II presents the comparison of maternal outcomes between women with first-trimester bleeding and those without. The exposed group exhibited higher rates of preeclampsia, preterm premature rupture of membranes (PROM), placental abruption, placenta previa, and intrauterine growth restriction (IUGR). Statistically significant differences were observed for placental abruption and IUGR ($p < 0.05$). The strength of these associations was quantified using relative risk (RR) with corresponding 95% confidence intervals (CI).

Table II. Comparison of Maternal Outcomes

Maternal Outcome	Exposed (n=53)	Unexposed (n=53)	Relative Risk (95% CI)	p-value
Preeclampsia	8 (15.1%)	3 (5.7%)	2.66 (0.75–9.38)	0.12
Preterm PROM	9 (17.0%)	4 (7.5%)	2.25 (0.75–6.70)	0.14
Placental Abruption	7 (13.2%)	1 (1.9%)	7.00 (0.89–54.6)	0.03*
Placenta Previa	5 (9.4%)	2 (3.8%)	2.50 (0.51–12.2)	0.24
IUGR	11 (20.8%)	4 (7.5%)	2.75 (1.01–7.49)	0.04*

*Statistically significant

Table III compares perinatal outcomes between the two groups. The mean birth weight and Apgar scores at 1 and 5 minutes were lower in the exposed group. Preterm delivery and NICU admission were significantly higher among exposed females ($p < 0.05$). Neonatal mortality and congenital anomalies were more frequent in the exposed group but did not reach statistical significance.

Table III. Comparison of Perinatal Outcomes

Perinatal Outcome	Exposed (n=53)	Unexposed (n=53)	Relative Risk (95% CI)	p-value
Birth Weight (grams), Mean $\pm$ SD	2590 $\pm$ 480	2890 $\pm$ 420	—	0.002*
Preterm Delivery	18 (34.0%)	6 (11.3%)	3.00 (1.31–6.86)	0.006*
APGAR (1 min), Median (IQR)	6 (5–8)	8 (7–9)	—	0.01*
APGAR (5 min), Median (IQR)	8 (7–9)	9 (8–10)	—	0.02*
NICU Admission	16 (30.2%)	5 (9.4%)	3.20 (1.30–7.84)	0.008*
Neonatal Mortality	4 (7.5%)	1 (1.9%)	4.00 (0.47–34.2)	0.17
Congenital Anomalies	3 (5.7%)	1 (1.9%)	3.00 (0.32–27.8)	0.30

*Statistically significant

Table IV presents multivariate logistic regression analysis adjusting for potential confounders including maternal age, gestational age, socioeconomic status, parity, previous abortion history, smoking exposure, and comorbidities. After adjustment, first trimester vaginal bleeding remained independently associated with preterm delivery, IUGR, and NICU admission.

Table IV. Adjusted Relative Risks of Significant Outcomes

Outcome	Adjusted risk ratio (95% CI)	p-value
Preterm Delivery	2.72 (1.15–6.40)	0.02*
IUGR	2.48 (1.01–6.09)	0.04*
NICU Admission	2.89 (1.18–7.05)	0.02*
Placental Abruption	5.90 (0.70–49.8)	0.09

*Statistically significant

DISCUSSION

This paper has analyzed maternal and perinatal outcomes of women with first-trimester vaginal bleeding compared to unexposed controls. We demonstrate that first-trimester vaginal bleeding is associated with the risks of inadequate maternal outcomes, such as placental abruption and intrauterine growth restriction (IUGR), and inadequate perinatal outcomes, such as preterm birth, low birth weight, and increased NICU hospitalization.

The proportion of women experiencing first-trimester bleeding in our cohort is comparable to reports from other studies in the region. In research conducted by Ayub et al. in Timergara and Peshawar, pregnancies complicated by early bleeding were found to have

unfavorable outcomes, emphasizing its potential as an early indicator of obstetric complications [11]. Likewise, Mohamed et al. reported that these pregnancies carry a higher likelihood of preterm delivery and reduced birth weight, which aligns with the trends observed in our study. [12]. Nigar et al. also found that the incidence of IUGR and NICU admissions in early-bleeding pregnancy was also high [13].

The impact of early pregnancy vaginal bleeding and unfavorable obstetric outcomes is supported by systematic reviews and meta-analyses. Karimi et al. inferred that the first-trimester bleeding was a powerful indicator of placental disorders, preterm births, and low birth weight [14]. On the same note, similar findings were made by Halim et al. who

asserted that early bleeding predisposes the mother to complications making it important to monitor such pregnancies well [15]. Similar patterns in maternal and perinatal outcomes were also described by Pervaiz et al., who included the increased rates of preterm birth and NICU admission [16].

We also find consistency with the international data. In a huge Chinese cohort study, Sun et al. identified first-trimester bleeding to be linked with preterm birth, IUGR, and low Apgar scores [17]. Similar results were reported in a semi-urban Indian population by Choudhury et al., which supports the fact that such complications cannot be associated with a particular region [18]. Bever et al. also showed that patterns of fetal growth are highly distorted in pregnancies with premature bleeding which is consistent with observation of low birth weights [19]. Sadia et al. recently conducted a Karachi-based study, that examined early and late complications of women with first-trimester bleeding and it was discovered that the prevalence rates of preterm birth and NICU admissions were high. [20].

This is due to the fact that there is a high risk of adverse outcomes due to possible pathophysiological processes, including ineffective placentation and the decline in the utero-placental blood flow. Early vaginal bleeding can be associated with sub chorionic hemorrhages and other pathologies of the placenta that could be the cause of the maternal and neonatal complications.

Limitations of study: This research has a number of limitations. First of all, it was carried out in one tertiary care center and it might not be applicable to other populations. Secondly, the size of the sample was not that large, and it might have compromised the statistical power to detect correlations with less common outcomes, including congenital anomalies or neonatal mortality. Thirdly, certain maternal risk factors, such as nutritional status and elaborate lifestyle habits, were not managed and this could confound the findings. Lastly, the research was based on self-reported past bleeding history and this could be prone to recall bias.

CONCLUSION

Periconceptual vaginal bleeding among the first trimester is also a definite indicator of maternal and perinatal morbidity, including preterm birth, low birth weight, IUGR, placental abruption, and high NICU admission. A diagnosis and close screening of the pregnancy that is already complicated by first-trimester bleeding is required to improve the maternal and neonatal outcomes. Clinicians are also encouraged to advise the affected women on the risks that are likely to be encountered and implement the right measures on antenatal surveillance measures.

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