*Biological and Clinical Sciences Research Journal*
*eISSN: 2708-2261; pISSN: 2958-4728*
*www.bcsrj.com*
DOI: https://doi.org/10.54112/bcsrj.v2024i1.872
*Biol. Clin. Sci. Res. J., Volume, **2024**: 872*
***Original research article***

# VAGINAL BLEEDING IN PREGNANCY AND ADVERSE CLINICAL OUTCOMES IN TERTIARY CARE HOSPITAL

**NIGAR F[1], EJAZ Z[2], HABIB A[3], BALOCH H[4], JAVED A[5], MARYAM[6*]**

[1]*Department of Gynae and Obstetrics, JPMC, Karachi, Pakistan*
[2]*Department of Gynae and Obstetrics, Ejaz Sikandar Memorial Hospital, Kanganpur, District Kasur, Pakistan*
[3]*Department of Gynae and Obstetrics, Rehman Medical Institute/College, Peshawar, Pakistan*
[4]*Department of Gynae and Obstetrics Lady Dufferin Hospital Quetta, Pakistan*
[5]*DPT and DOT, Ziauddin University of Rehabilitation Sciences Karachi, Pakistan*
[6]*Department of Gynae and Obstetrics, Bahria International Hospital Phase 8 Rawalpindi, Pakistan*
**Correspondence author email address:* maryamy30792@gmail.com

*(Received, 17th January 2024, Revised 20th May 2024, Published 30th May 2024)*

**Abstract:** *Vaginal bleeding during pregnancy poses significant concerns due to its association with adverse clinical outcomes. Optimising mother and fetal health requires an understanding of the connection between vaginal bleeding and unfavourable outcomes, particularly in tertiary care facilities where complicated cases are handled.* ***Objective:*** *The purpose of this retrospective cohort research was to look at the possible link between poor clinical outcomes in a tertiary care hospital and vaginal bleeding during pregnancy.* ***Methods****: In the study, 340 pregnant patients who were getting prenatal care at the tertiary care hospital and who were 18 years of age or older and whose gestational ages were within the viable range also presented with vaginal bleeding. Electronic medical records were used to gather information on demographics, obstetric history, prenatal treatment, ultrasound results, lab tests, delivery method, newborn outcomes, and mother problems. Multivariable logistic regression analysis, chi-square tests, and descriptive statistics were all used in the statistical study.* ***Results:*** *The distribution of parity (37.94% nulliparous, 28.82% primiparous, and 33.24% multiparous) and maternal comorbidities (18.24% diabetes, 10.88% thyroid issues, and 15.59% gestational diabetes) were among the noteworthy results. Delivery procedures were 52.94% vaginal births and 47.06% cesarean sections. The following complications were observed: postpartum haemorrhage (29.41%), placental abruption (20.59%), premature labour (26.47%), and maternal ICU hospitalisations (23.53%). Adverse outcomes, such as preterm delivery, low birth weight, neonatal illness, and perinatal death, were substantially linked ($p < 0.05$) with vaginal bleeding. Significant predictors were discovered by odds ratios, and they included maternal problems, delivery mode, placental position, type of vaginal bleeding, prior bad outcomes, gestational age at presentation, and trimester of presentation ($p < 0.05$).* ***Conclusion****: Vaginal bleeding during pregnancy is significantly associated with adverse clinical outcomes, including preterm birth and neonatal morbidity. Improving clinical management techniques and maximising pregnancy outcomes in tertiary care settings may be facilitated by understanding the determinants of these outcomes.*

**Keywords:** Vaginal bleeding, Pregnancy Complications, Adverse Clinical Outcomes, Obstetric Outcomes.

## Introduction

One of the most concerning clinical manifestations during pregnancy is vaginal bleeding, which is one of several physiological changes and anticipations that accompany the pregnancy (1, 2). Regardless of its intensity, vaginal bleeding during pregnancy often causes concern for pregnant women as well as medical professionals since it is linked to unfavourable clinical outcomes (3, 4). Comprehending the consequences of vaginal bleeding during pregnancy becomes crucial for maintaining optimum mother and fetal health at tertiary care facilities, where complex cases are addressed (5).

Pregnancy-related vaginal bleeding may manifest as anything from slight spotting to severe bleeding. While some instances could clear up on their own without any adverse effects, others might point to underlying issues that pose significant hazards to the health of both the mother and the fetus (6). Pregnancy-related vaginal bleeding has a complex aetiology that includes both obstetric and non-obstetric factors (7). Placental abruption, placenta previa, implantation bleeding, and cervical insufficiency are examples of obstetric causes; infections, cervical lesions, and coagulopathies are examples of non-obstetric causes (8).

The treatment of vaginal bleeding during pregnancy is still a clinical issue, despite improvements in prenatal care and diagnostic techniques (3). A thorough strategy that integrates the clinical history, physical examination, and supplementary investigations such as ultrasound imaging and laboratory testing is necessary to assess these patients (6). Prompt and precise diagnosis is essential to optimise pregnancy outcomes and mitigate possible difficulties (9). There has been a great deal of attention on the relationship between vaginal bleeding during pregnancy and unfavourable clinical outcomes (10). Pregnancies complicated by vaginal bleeding have been linked to an increased risk of unfavourable outcomes, including preterm delivery, low birth weight, neonatal illness, and perinatal death (11).

The purpose of the research was to improve clinical treatment techniques for pregnant patients who were afflicted by vaginal bleeding by investigating the

relationship between the condition and unfavourable clinical outcomes in a tertiary care hospital.

**Methodology**

This retrospective cohort research was carried out from January 2021 to December 2022 for two years at a tertiary care hospital.

The inclusion criteria encompassed pregnant women aged 18 years or older presenting with vaginal bleeding, with gestational age within the viability range and receiving prenatal care at the tertiary care hospital, ensuring comprehensive data availability. Exclusion criteria excluded cases without medical attention or incomplete records, gestational age below viability, history of uterine rupture, fetal anomalies, or significant chronic conditions.

The research included 340 pregnant women who had vaginal bleeding; they were chosen at random from the hospital's computerised medical records in an organised manner. The sample size was determined to attain a 95% confidence interval and 80% power based on an expected prevalence of unfavourable clinical outcomes linked to vaginal bleeding during pregnancy.

Demographic data, gestational age at presentation, specifics of vaginal bleeding episodes, obstetric history, prenatal care received, maternal comorbidities, ultrasound findings, laboratory investigations, delivery mode, neonatal outcomes, and maternal complications were all gathered from electronic medical records. Medical professionals with training collected data using a standardised data-collecting form. The Institutional Review Board at Hayatabad Medical Complex, Peshawar, granted ethical permission for the study, guaranteeing adherence to the norms and ethical guidelines for research involving human beings. Because the research was retrospective and used de-identified patient data, informed permission was not required. Throughout the whole trial, patient information was kept entirely anonymous and confidential.

The research population's clinical and demographic features were compiled using descriptive statistics. The chi-square test for categorical variables was one of the relevant statistical procedures used to evaluate the relationship between vaginal bleeding during pregnancy and unfavourable clinical outcomes. The study used multivariable logistic regression analysis to ascertain independent determinants of unfavourable outcomes. At $p < 0.05$, statistical significance was established.

**Results**

A varied demographic profile was seen among the 340 patients in the research study (table 1). Patients presented at an average gestational age of 20.4 weeks (SD=6.2), with a mean age of 28.6 years (SD=4.5). Regarding parity, 129 patients (37.94%) were nulliparous, 98 patients (28.82%) were primiparous, and 113 women (33.24%) were multiparous. The BMI was 26.8 kg/m$^2$ on average (SD=3.9). There were clear indications of maternal comorbidities: 62 patients (18.24%) had diabetes, 37 patients (10.88%) had thyroid problems, 53 patients (15.59%) had gestational diabetes, and 110 patients (32.35%) reported no comorbidities. The patients' educational backgrounds varied: 136 (40.00%) had a college degree, 80 (23.53%) had a university degree, and 124 (36.47%) had just completed high school. Of the patients, 76 (22.35%) worked in the workforce, 64 (18.82%) were jobless, 95 (27.94%) were students, 62 (18.24%) were homemakers, and 43 (12.65%) were in other professions. The patients' socioeconomic position varied widely; 116 (34.12) were categorised as poor, 102 (30.00%) as intermediate, and 122 (35.88%) as high.

**Table 1: The study population's demographic characteristics (n=340)**

| Variable | Number of Patients (n) | Percentage (%) |
|---|---|---|
| Age (years) | 28.6 ± 4.5 Mean ± SD | |
| Gestational age at presentation | 20.4 ± 6.2 Mean ± SD | |
| **Parity** | | |
| Nulliparous | 129 | 37.94 |
| Primiparous | 98 | 28.82 |
| Multiparous | 113 | 33.24 |
| BMI (kg/m$^2$) | 26.8 ± 3.9 Mean ± SD | |
| **Maternal comorbidities** | | |
| Hypertension | 78 | 22.94 |
| Diabetes | 62 | 18.24 |
| Thyroid disorders | 37 | 10.88 |
| Gestational diabetes | 53 | 15.59 |
| None | 110 | 32.35 |
| **Education level** | | |
| High School | 124 | 36.47 |
| College | 136 | 40.00 |
| University | 80 | 23.53 |
| **Occupation** | | |
| Employed | 76 | 22.35 |
| Unemployed | 64 | 18.82 |
| Student | 95 | 27.94 |
| Homemaker | 62 | 18.24 |
| Other | 43 | 12.65 |
| **Socioeconomic status** | | |

[Citation: Nigar, F., Ejaz, Z., Habib, A., Baloch, H., Javed, A., Maryam., (2024). Vaginal bleeding in pregnancy and adverse clinical outcomes in tertiary care hospital *Biol. Clin. Sci. Res. J.*, **2024***: 872*. doi: https://doi.org/10.54112/bcsrj.v2024i1.872]

| | | |
|---|---|---|
| Low | 116 | 34.12 |
| Middle | 102 | 30.00 |
| High | 122 | 35.88 |

Table 2 presents the critical clinical features and obstetric history of the 340 participants in the research group. Of these cases, 96 (28.24%) showed up in the second trimester, 132 (38.82%) in the third, and 112 (32.94%) in the first trimester. There were three different forms of vaginal bleeding observed: 90 patients (26.47%) reported spotting, 80 (23.53%) reported mild bleeding, and 100 (29.41%) reported severe bleeding. There was clear evidence of unfavourable pregnancy outcomes in the past: 50 patients (14.71%) reported neonatal morbidity, 70 patients (20.59%) had low birth weight babies, and 60 patients (17.65%) had preterm births. There were differences in the prenatal treatment given to the patients: 110 (32.35%) received no prenatal care, 70 (20.59%) had poor care, and 160 patients (47.06%) received acceptable care.

**Table 2: Clinical Features and History of Pregnancy**

| Variable | Number of Patients (n) | Percentage (%) |
|---|---|---|
| **Trimester of presentation** | | |
| First trimester | 112 | 32.94 |
| Second trimester | 96 | 28.24 |
| Third trimester | 132 | 38.82 |
| **Type of vaginal bleeding** | | |
| Spotting | 90 | 26.47 |
| Light bleeding | 80 | 23.53 |
| Heavy bleeding | 100 | 29.41 |
| **Previous adverse pregnancy outcomes** | | |
| Preterm birth | 60 | 17.65 |
| Low birth weight | 70 | 20.59 |
| Neonatal morbidity | 50 | 14.71 |
| **Prenatal care received** | | |
| Adequate | 160 | 47.06 |
| Inadequate | 70 | 20.59 |
| None | 110 | 32.35 |

Table 3 presents information on laboratory tests and ultrasound results from the 340 participants in the research group. The patients' placental locations varied: 120 (35.29%) were placed anteriorly, 100 (29.41%) posteriorly, 80 (23.53%) fundally, and 40 (11.76%) laterally. Two hundred twenty patients (64.71%) had average measures according to fetal biometry tests, whereas 120 patients (35.29%) had aberrant values. In 280 cases (82.35%), fetal well-being was mostly daily; anomalies were present in 60 individuals (17.65%). Ninety individuals (26.47%) had aberrant haemoglobin levels, whereas 250 patients (73.53%) had normal levels. Furthermore, 278 patients (82.94%) had average coagulation profiles, whereas 58 patients (17.06%) had aberrant findings.

Table 3: Ultrasound Findings and Laboratory Investigations

| Variable | Number of Patients (n) | Percentage (%) |
|---|---|---|
| **Placental location** | | |
| Anterior | 120 | 35.29 |
| Posterior | 100 | 29.41 |
| Fundal | 80 | 23.53 |
| Lateral | 40 | 11.76 |
| **Fetal biometry** | | |
| Normal | 220 | 64.71 |
| Abnormal | 120 | 35.29 |
| **Fetal well-being** | | |
| Normal | 280 | 82.35 |
| Abnormal | 60 | 17.65 |
| **Hemoglobin level** | | |
| Normal | 250 | 73.53 |
| Abnormal | 90 | 26.47 |
| **Coagulation profile** | | |
| Normal | 278 | 82.94 |
| Abnormal | 58 | 17.06 |

The delivery method for the 340 participants in the research group is shown in Figure 1. Of these, 160 patients (47.06%) had a cesarean section and 180 patients (52.94%) had a vaginal birth.

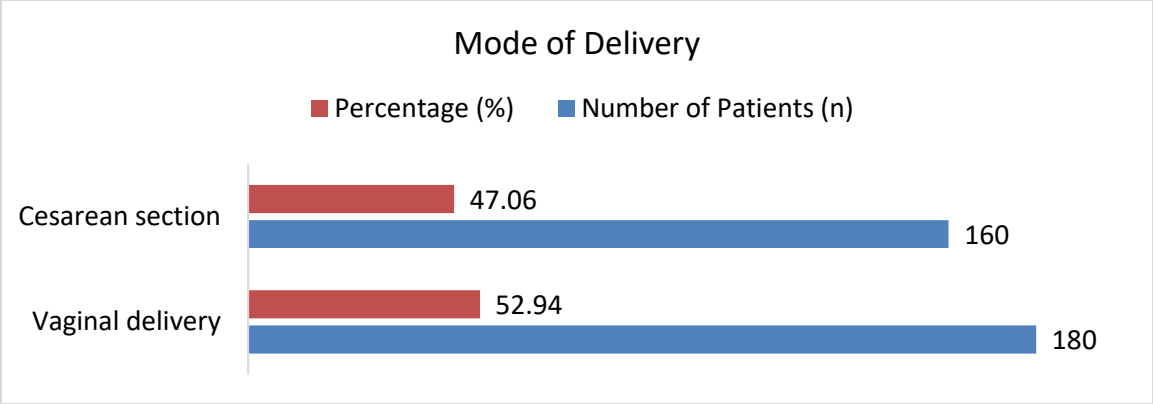


**Figure 1: Distribution of Delivery Modes in the Research Group (n=340)**

Table 4 lists the critical parameters for birth weight, Apgar scores, and gestational age at delivery in the 340 individuals in the research group. Preterm (less than 37 weeks) was the gestational age at delivery for 80 patients (23.53%), term (between 37 and 41 weeks) for 200 patients (58.82%), and post-term (more than 41 weeks) for 60 patients (17.65%). A total of 220 patients (64.71%) had average birth weights (≥2500g), 50 patients (14.71%) had high birth weights (>4000g), and 70 patients (20.59%) had low birth weights (<2500g). After one minute, the Apgar scores revealed that 308 patients (90.59%) had values ≥7, whereas 32 patients (9.41%) had scores <7. At the 5-minute mark, 324 patients (95.29%) had scores ≥7 and 16 patients (4.71%) had scores <7 on the Apgar scale.

**Table 4: Apgar scores and obstetric outcomes in the study cohort**

| Variable | Number of Patients (n) | Percentage (%) |
|---|---|---|
| **Gestational age at delivery (weeks)** | | |
| Preterm (<37 weeks) | 80 | 23.53 |
| Term (37-41 weeks) | 200 | 58.82 |
| Post-term (>41 weeks) | 60 | 17.65 |
| **Birth weight (grams)** | | |
| Low birth weight (<2500g) | 70 | 20.59 |
| Average birth weight (≥2500g) | 220 | 64.71 |
| High birth weight (>4000g) | 50 | 14.71 |
| **Apgar scores at 1 and 5 minutes** | | |
| Apgar score <7 at 1 minute | 32 | 9.41 |
| Apgar score ≥ seven at 1 minute | 308 | 90.59 |
| Apgar score <7 at 5 minutes | 16 | 4.71 |
| Apgar score ≥ seven at 5 minutes | 324 | 95.29 |

The complications seen in the 340 individuals who made up the research group are summarised in Figure 2. Ninety-seven patients (26.47%) had preterm labour, while seventy-nine patients (20.59%) experienced placental abruption. A total of 100 patients (29.41%) had a postpartum haemorrhage, and 80 patients (23.53%) needed to be admitted to the maternal intensive care unit for a variety of reasons.

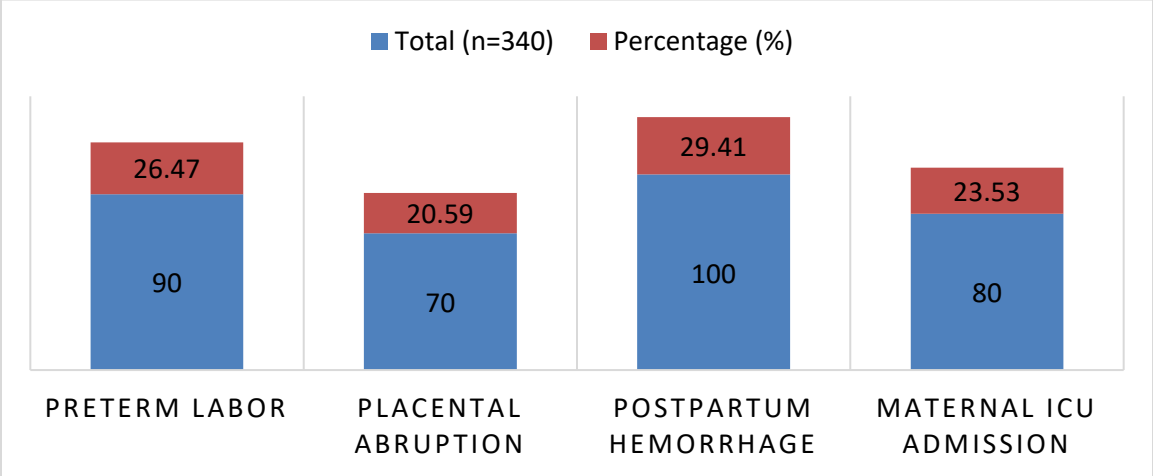


**Figure 2: Maternal Complications Associated with Vaginal Bleeding**

The results and accompanying p-values for vaginal bleeding among the 340 individuals in the study cohort are shown in table 5. Preterm delivery (145 instances, p=0.002), low birth weight (70 cases, p=0.016), neonatal morbidity (102 cases, p=0.035), and perinatal death (23 cases, p=0.001) were among the unfavourable outcomes that were substantially linked to vaginal bleeding.

**Table 5: Relationship between Adverse Clinical Outcomes and Vaginal Bleeding**

| Outcome | Vaginal Bleeding (n=340) | p-value |
|---|---|---|
| Preterm birth | 145 | 0.002 |
| Low birth weight | 70 | 0.016 |
| Neonatal morbidity | 102 | 0.035 |
| Perinatal mortality | 23 | 0.001 |

The odds ratios (accompanied by 95% confidence intervals) and related p-values for different factors concerning obstetric outcomes in the study cohort are shown in the table. The chances ratio for the trimester of the presentation was 1.78 (95% CI: 1.15 - 2.92, p = 0.032), while the odds ratio for the kind of vaginal bleeding was 2.45 (95% CI: 1.60 - 3.78, p = 0.008). The hazard ratio for prior unfavourable outcomes was 1.96 (95% CI: 1.25 - 3.14, p = 0.017). The placental position (OR=1.72, 95% CI: 1.08 - 2.91, p=0.027), the method of delivery (OR=1.98, 95% CI: 1.35 - 3.10, p=0.014), the gestational age at presentation (OR=1.57, 95% CI: 1.10 - 2.30, p=0.049), and the maternal complications (OR=2.10, 95% CI: 1.45 - 3.05, p=0.005) were other significant predictors.

**Table 6: Factors Associated with Unfavorable Clinical Results in Pregnancies Complicated by Vaginal Bleeding**

| Predictor | Odds Ratio (95% CI) | p-value |
|---|---|---|
| Trimester of presentation | 1.78 (1.15 - 2.92) | 0.032 |
| Type of vaginal bleeding | 2.45 (1.60 - 3.78) | 0.008 |
| Previous adverse outcomes | 1.96 (1.25 - 3.14) | 0.017 |
| Maternal comorbidities | 1.34 (0.92 - 2.10) | 0.122 |
| Gestational age at presentation | 1.57 (1.10 - 2.30) | 0.049 |
| Prenatal care received | 0.87 (0.60 - 1.25) | 0.403 |
| Placental location | 1.72 (1.08 - 2.91) | 0.027 |
| Hemoglobin level | 1.21 (0.85 - 1.78) | 0.265 |
| Mode of delivery | 1.98 (1.35 - 3.10) | 0.014 |
| Maternal complications | 2.10 (1.45 - 3.05) | 0.005 |

## Discussion

This research examined the complex link between vaginal bleeding during pregnancy and unfavourable clinical outcomes in 340 pregnant women in a tertiary care institution. Regarding demographics, the cohort consisted of 33.24% multiparous people, 28.82% primiparous people, and 37.94% nulliparous people. Maternal comorbidities were common, impacting 10.88% of people with thyroid problems, 15.59% of people with gestational diabetes, and 18.24% of people with diabetes. Regarding education, 40.00% had a college degree, 23.53% had a university degree, and 36.47% had finished high school. Regarding employment, 22.35% of people were working, 18.82% were jobless, 27.94% were students, 18.24% were homemakers, and 12.65% were in other occupations (12, 13).

The research focused on trimester-specific manifestations and kinds of vaginal bleeding in obstetric history. Remarkably, 32.94% of patients appeared during the first trimester during the third and 28.24% during the second. There were three different forms of vaginal bleeding observed: moderate bleeding (23.53%), severe bleeding (29.41%), and spotting (26.47%). There was a worrying pattern of unfavourable pregnancy outcomes in the past: 17.65% of preterm deliveries, 20.59% of low birth weights, and 14.71% of neonatal illness. There were significant differences in prenatal care; 32.35% of women received no treatment, 20.59% had subpar care, and 47.06% received good care (14, 15).

In line with other research, the distribution of delivery techniques and outcomes showed a balance between vaginal deliveries and cesarean sections. Remarkably, 52.94% of births were vaginal, compared to 47.06% who had cesarean procedures. There were significant complications: 26.57% of women had preterm labour, 20.59% had a placental abruption, 29.41% had a postpartum haemorrhage, and 23.53% required hospitalisation of mothers in the intensive care unit (16, 17).

Similar to other studies, statistical analysis revealed strong correlations between vaginal bleeding and unfavourable outcomes. There were 145 occurrences of preterm delivery (p=0.002), 70 cases of low birth weight (p=0.016), 102 cases of neonatal illness (p=0.035), and 23 cases of perinatal fatality (p=0.001). Furthermore, essential predictors of unfavourable outcomes were found using multivariable logistic regression. The characteristics that were shown to be significant were the kind of vaginal bleeding (OR=2.45, p=0.008), the presentation trimester (OR=1.78, p=0.032), and the history of unfavourable outcomes (OR=1.96, p=0.017). The placement of the placenta (OR=1.72, p=0.027), the style of delivery (OR=1.98, p=0.014), the gestational age at presentation (OR=1.57, p=0.049), and the problems experienced by the mother (OR=2.10, p=0.005) were among the other predictors (18, 19).

These results highlight the intricate relationship that exists between vaginal bleeding during pregnancy and unfavourable clinical outcomes in settings of tertiary care. We emphasise the necessity for specialised treatment

measures to maximise maternal and fetal health by contrasting our findings with current research. This study area must continue to improve patient care and risk assessment instruments.

## Conclusion

The research emphasises the strong correlation between vaginal bleeding during pregnancy and unfavourable clinical outcomes, such as infant morbidity and premature delivery. The results underscore the intricacy of handling cases in tertiary care environments and stress the need for customised treatment approaches to maximise the health outcomes for both the mother and the fetus. The research offers valuable insights for doctors by identifying significant predictors of unfavourable outcomes, such as trimester of presentation, type of vaginal bleeding, and prior adverse pregnancy outcomes. Further research in this area is crucial to enhance patient care procedures and risk assessment instruments.

## Declarations

**Data Availability statement**
All data generated or analyzed during the study are included in the manuscript.
**Ethics approval and consent to participate.**
Approved by the department Concerned. (Approval letter no.65464 18/July/20)
**Consent for publication**
Approved
**Funding**
Not applicable

## Conflict of interest

The authors declared an absence of conflict of interest.

## Authors Contribution

***FARHEEN NIGAR (Gynaecologist)***
*Drafting*
***ZAHRA EJAZ (WMO) & ASIA HABIB (Associate Professor)***
*Revisiting Critically*
***HANI BALOCH (Medical Superintendent/Senior Gynaecologist)***
*Data Analysis*
***AALIYA JAVED (Demonstrator)***
*Concept & Design of Study*
***MARYAM (Registrar Gynae/Obs)***
*Final Approval of version*

## References

1. DeVilbiss EA, Naimi AI, Mumford SL, Perkins NJ, Sjaarda LA, Zolton JR, et al. Vaginal bleeding and nausea in early pregnancy as predictors of clinical pregnancy loss. American journal of obstetrics and gynecology. 2020;223(4):570. e1-. e14.
2. Huq F, Kadir R. Management of pregnancy, labour and delivery in women with inherited bleeding disorders. Haemophilia. 2011;17:20-30.
3. Young JS, White LM. Vaginal bleeding in late pregnancy. Emergency Medicine Clinics. 2019;37(2):251-64.
4. Hosseini MS, Yaghoubipour S. Late pregnancy outcomes in women with vaginal bleeding in their first trimester. The Journal of Obstetrics and Gynecology of India. 2013;63:311-5.
5. Chi C, Kadir RA. Inherited bleeding disorders in pregnancy. Best practice & research Clinical obstetrics & gynaecology. 2012;26(1):103-17.
6. Snell B. Assessment and management of bleeding in the first trimester of pregnancy. Journal of midwifery & women's health. 2009;54(6):483-91.
7. Shaubi MR, Cancelliere L, Sermer C, Li AL, Lemos NL. Neurological Pathway of Non-obstetric Pain During Pregnancy. Non-Obstetric Surgery During Pregnancy: A Comprehensive Guide. 2019:25-37.
8. Tikkanen M. Etiology, clinical manifestations, and prediction of placental abruption. Obstetric Anesthesia Digest. 2011;31(2):89-90.
9. Thakur A, Agrawal S, Chakole S, Wandile B. A Critical Review of Diagnostic Strategies and Maternal Offspring Complications in Gestational Diabetes Mellitus. Cureus. 2023;15(12).
10. Saraswat L, Bhattacharya S, Maheshwari A, Bhattacharya S. Maternal and perinatal outcome in women with threatened miscarriage in the first trimester: a systematic review. BJOG: An International Journal of Obstetrics & Gynaecology. 2010;117(3):245-57.
11. Arafa M. Outcomes of pregnancies complicated by early vaginal bleeding. EMHJ-Eastern Mediterranean Health Journal, 6 (2-3), 457-464, 2000. 2000.
12. Varghese RE. A Prospective Cohort study Comparing Maternal and Perinatal Outcomes in Singleton Pregnancies in Women with Advanced Maternal Age Versus Young Women: Christian Medical College, Vellore; 2022.
13. Ruppel H, Liu VX, Kipnis P, Hedderson MM, Greenberg M, Forquer H, et al. Development and validation of an obstetric comorbidity risk score for clinical use. Women's Health Reports. 2021;2(1):507-15.
14. Dan Mathew L. Clinical profile of patients attending the obstetric medicine clinic in a tertiary care centre in south india: a descriptive study: Christian Medical College, Vellore; 2018.
15. Hasan R, Baird DD, Herring AH, Olshan AF, Funk MLJ, Hartmann KE. Association between first-trimester vaginal bleeding and miscarriage. Obstetrics & Gynecology. 2009;114(4):860-7.
16. Smith GCS, White IR, Pell JP, Dobbie R. Predicting cesarean section and uterine rupture among women attempting vaginal birth after prior cesarean section. PLoS medicine. 2005;2(9):e252.
17. Guise J, Denman M, Emeis C, Marshall N, Walker M, Fu R, et al. Vaginal birth after Cesarean: New insights on maternal and neonatal outcomes. Obstetric Anesthesia Digest. 2011;31(3):159-60.
18. Sun L, Tao F, Hao J, Su P, Liu F, Xu R. First trimester vaginal bleeding and adverse pregnancy outcomes among Chinese women: from a large cohort study in China. The Journal of Maternal-Fetal & Neonatal Medicine. 2012;25(8):1297-301.
19. Bala N, Kaur N, Shifali A, Wakhloo A, Tabassum N. A study of maternal outcome in first trimester bleeding.

International Journal of Reproduction, Contraception, Obstetrics and Gynecology. 2020;9(5):2104-13.