

Research Article

Association Between Antepartum Hemorrhage and Preterm Delivery at Dr. Hasan Sadikin General Hospital in 2025

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Abstract

Objective: This study aimed to determine the association between antepartum hemorrhage and the risk of preterm birth at Dr. Hasan Sadikin General Hospital in Bandung in 2025.

Methods: This analytical observational study used a retrospective cross-sectional design and secondary data from patients' medical records. The study population comprised all pregnant women who received obstetric care at Dr. Hasan Sadikin General Hospital, Bandung. A total sampling technique was used, including all subjects who met the inclusion and exclusion criteria. Data were analyzed using logistic regression in SPSS version 27.0.

Result: A total of 102 medical records were included in the analysis. Multivariate logistic regression revealed that women with antepartum hemorrhage had an eightfold higher risk of preterm birth compared with those without antepartum hemorrhage.

Conclusion: Antepartum hemorrhage was significantly associated with an increased risk of preterm birth at Dr. Hasan Sadikin General Hospital in Bandung in 2025 ($p < 0.05$).

Keywords: Antepartum hemorrhage; preterm birth; pregnancy

Hubungan Perdarahan Antepartum dan Risiko Persalinan Preterm di RSUP Dr. Hasan Sadikin Tahun 2025

Abstrak

Tujuan: Penelitian ini bertujuan untuk mengetahui hubungan antara perdarahan antepartum dan risiko persalinan preterm di RSUP Dr. Hasan Sadikin Bandung pada tahun 2025.

Metode: Penelitian observasional analitik ini menggunakan desain potong lintang retrospektif dengan memanfaatkan data sekunder yang diperoleh dari rekam medis pasien. Populasi penelitian mencakup seluruh ibu hamil yang mendapatkan pelayanan obstetri di RSUP Dr. Hasan Sadikin Bandung. Teknik total sampling digunakan dengan memasukkan seluruh subjek yang memenuhi kriteria inklusi dan eksklusi. Analisis data dilakukan menggunakan regresi logistik dengan perangkat lunak SPSS versi 27.0.

Hasil: Sebanyak 102 rekam medis dianalisis dalam penelitian ini. Analisis regresi logistik multivariat menunjukkan bahwa ibu hamil dengan perdarahan antepartum memiliki risiko delapan kali lebih tinggi mengalami persalinan preterm dibandingkan dengan ibu hamil tanpa perdarahan antepartum.

Kesimpulan: Perdarahan antepartum berhubungan secara signifikan dengan peningkatan risiko persalinan preterm di RSUP Dr. Hasan Sadikin Bandung pada tahun 2025 ($p < 0,05$).

Kata kunci: Perdarahan antepartum; persalinan prematur; kehamilan

Introduction

Antepartum hemorrhage (APH) is bleeding from the genital tract that occurs after fetal viability is reached and before the birth of the infant. It remains a major obstetric emergency and a leading cause of maternal and perinatal morbidity and mortality worldwide. Although APH may occur at any gestational age, bleeding during preterm pregnancy (<37 weeks of gestation) carries particularly serious implications, as it not only threatens maternal well-being but also increases the risk of preterm birth, impaired fetal development, and neonatal death. Bleeding during late pregnancy always warrants prompt evaluation and management because it may represent life-threatening obstetric conditions, including placenta previa, placental abruption, and other placental abnormalities.¹

Globally, obstetric hemorrhage remains a leading cause of maternal mortality. The World Health Organization (WHO) recognizes hemorrhage as a major, potentially preventable cause of maternal death through early detection and appropriate management. In preterm pregnancies, antepartum hemorrhage often necessitates early termination of pregnancy, increasing the incidence of preterm delivery and neonatal complications. Preterm infants are at substantially higher risk of respiratory distress syndrome, intraventricular hemorrhage, necrotizing enterocolitis, neonatal sepsis, neurodevelopmental impairment, and perinatal mortality compared with term infants. Consequently, antepartum hemorrhage during preterm pregnancy is a significant healthcare concern because it directly affects both the mother and the fetus.^{1,2}

Antepartum hemorrhage occurs in approximately 3–5% of pregnancies and is most commonly caused by placenta previa and placental abruption. Placenta previa is

characterized by placental implantation in the lower uterine segment, partially or completely covering the internal cervical os. Its classic clinical manifestation is painless, bright-red vaginal bleeding, typically occurring in the late second or third trimester. As gestation progresses, stretching of the lower uterine segment may cause partial placental separation, leading to recurrent episodes of bleeding of varying severity. Placenta previa is a leading cause of antepartum hemorrhage and is associated with an increased risk of preterm birth, emergency cesarean delivery, blood transfusion, and neonatal intensive care admission.³

Recent studies have shown that women with placenta previa who experience antepartum hemorrhage are at significantly higher risk of preterm birth than those without bleeding. Antepartum hemorrhage not only increases the likelihood of preterm delivery but is also associated with low birth weight, admission to the neonatal intensive care unit (NICU), and other adverse neonatal outcomes. Recurrent bleeding during pregnancy often necessitates delivery before term to prevent severe maternal complications.^{4,5}

Placental abruption is another important cause of antepartum hemorrhage in preterm pregnancies. It is defined as the premature separation of a normally implanted placenta before delivery. The condition is typically characterized by vaginal bleeding, abdominal pain, increased uterine tone, persistent uterine contractions, and signs of fetal compromise. Placental abruption is particularly dangerous because it can cause acute fetal hypoxia due to impaired uteroplacental perfusion. In the mother, severe blood loss may lead to hypovolemic shock, disseminated intravascular coagulation (DIC), acute kidney injury, and even death. Risk factors include chronic hypertension, preeclampsia, abdominal trauma, smoking, and a history of placental abruption in prior pregnancies.^{6,7}

Other less common but clinically

important causes of antepartum hemorrhage include vasa previa, placenta accreta spectrum disorders, uterine rupture, cervical trauma, cervical polyps, cervical infections, and cervical malignancy. Vasa previa is particularly hazardous because fetal blood vessels traverse the membranes near the internal cervical os without the protection of placental tissue or the umbilical cord. Rupture of these vessels can lead to rapid fetal exsanguination. Although less prevalent than placenta previa and placental abruption, vasa previa requires early diagnosis with ultrasonography to prevent adverse perinatal outcomes.^{5,6}

Managing antepartum hemorrhage in preterm pregnancy poses substantial clinical challenges. On the one hand, immediate delivery may be necessary to preserve maternal health in cases of severe bleeding or hemodynamic instability. On the other hand, prolonging pregnancy whenever possible is crucial to enhance fetal organ maturation and reduce complications associated with prematurity. Clinical decision-making, therefore, requires consideration of multiple factors, including gestational age, severity of bleeding, maternal condition, fetal well-being, and the underlying etiology of hemorrhage. A multidisciplinary approach involving obstetricians, neonatologists, anesthesiologists, and transfusion medicine specialists is often required to achieve optimal outcomes.⁴

When maternal and fetal conditions are clinically stable, conservative management may be considered. This approach includes hospitalization or close observation, fetal surveillance, serial laboratory assessments, and antenatal corticosteroids to accelerate fetal lung maturation. The WHO recommends antenatal corticosteroids for women at risk of preterm delivery because they have been shown to reduce neonatal mortality, respiratory distress syndrome, and other complications of prematurity. In selected

cases, tocolytic therapy may also be used to temporarily delay delivery, allowing adequate time for corticosteroid administration and transfer to facilities equipped with neonatal intensive care services.⁸

The association between antepartum hemorrhage and preterm birth is supported by robust molecular and pathophysiological mechanisms. Decidual hemorrhage, particularly in chronic placental abruption or vascular disruption associated with placenta previa, triggers massive activation of the local coagulation cascade. This process generates large amounts of thrombin, which functions not only as a hemostatic factor but also as a potent pro-inflammatory mediator within the fetomaternal environment. Thrombin stimulates the expression of inflammatory cytokines such as interleukin-8 (IL-8) and promotes the release of matrix metalloproteinases (MMPs), particularly MMP-1 and MMP-9. These proteolytic enzymes degrade the extracellular matrix of the fetal membranes and cervical collagen, resulting in premature cervical ripening and increased susceptibility to premature rupture of membranes. Furthermore, thrombin and inflammatory cytokines enhance myometrial contractility, thereby initiating preterm labor.^{1,8}

Beyond inflammatory and coagulation pathways, antepartum hemorrhage may also cause uteroplacental ischemia. Recurrent or severe bleeding reduces the functional placental surface available for gas and nutrient exchange, resulting in acute or chronic fetal hypoxia. Under hypoxic stress, the fetal hypothalamic–pituitary–adrenal (HPA) axis is prematurely activated, leading to increased secretion of placental corticotropin-releasing hormone (CRH). Elevated CRH levels stimulate prostaglandin production by the chorion and decidua, which promotes uterine contractions. In many clinical scenarios, preterm birth associated with antepartum hemorrhage may occur either spontaneously

or as an iatrogenic intervention undertaken to prevent severe maternal hemorrhage or fetal compromise.³

Optimal antenatal care (ANC) is an important strategy for preventing and mitigating antepartum hemorrhage. Regular antenatal assessments help identify risk factors such as prior cesarean delivery, placenta previa, hypertensive disorders of pregnancy, multiple gestation, and a history of antepartum hemorrhage. Routine ultrasonographic examination also plays a critical role in the early detection of placental abnormalities, enabling closer monitoring and timely intervention. Furthermore, pregnant women should receive education about warning signs, including vaginal bleeding, severe abdominal pain, and decreased fetal movement, to ensure prompt medical consultation when symptoms arise.^{1,3}

Preventive efforts are especially important in preterm pregnancies because antepartum hemorrhage substantially increases the risk of preterm birth and related neonatal complications. Women with high-risk pregnancies require close surveillance to detect placental dysfunction and bleeding early. Early diagnosis and appropriate management of conditions such as placenta previa and placental abruption may prolong gestation, reduce the need for emergency delivery, and improve maternal and perinatal outcomes. Therefore, prevention strategies should focus not only on reducing the incidence of hemorrhage but also on minimizing the risk of preterm birth and its associated complications.^{1,3}

Preterm pregnancy was selected as the focus of the present study because it is a particularly vulnerable period when the adverse effects of antepartum hemorrhage are most pronounced. Hemorrhage during preterm gestation may impair uteroplacental perfusion, thereby reducing oxygen and nutrient delivery to the fetus. Placental hypoperfusion contributes to chronic fetal

hypoxia, oxidative stress, inflammatory activation, and the release of anti-angiogenic factors, all of which further compromise placental function. Additionally, significant maternal blood loss may cause hemodynamic instability that directly affects uteroplacental circulation. These mechanisms increase the risk of fetal growth restriction, fetal distress, preterm birth, and intrauterine fetal death. Consequently, preterm gestation provides the most relevant clinical setting for evaluating the impact of antepartum hemorrhage on maternal and perinatal outcomes and for identifying appropriate intervention strategies to prevent severe complications.⁹⁻¹¹

Method

This analytical observational study used a retrospective cross-sectional design and was conducted using secondary data from the medical records of pregnant women who delivered at Dr. Hasan Sadikin General Hospital, Bandung, between January and December 2025. The study population consisted of all pregnant women who received obstetric care during the study period. A total sampling approach was used, including all eligible subjects who met the predefined selection criteria.

The inclusion criteria were pregnant women who delivered at Dr. Hasan Sadikin General Hospital during the study period and had complete medical records available for review. The exclusion criteria were incomplete medical records or missing information on the primary study variables. Collected data included maternal demographic characteristics, obstetric history, antepartum hemorrhage status, and preterm birth outcomes. To minimize confounding, relevant maternal and obstetric variables, including maternal age, parity, antenatal care history, and gestational complications, were collected and included in the multivariate logistic regression model.

Antepartum hemorrhage was defined by the clinical diagnosis documented in the medical records, including placenta previa and placental abruption. The primary outcome was preterm birth, defined as delivery before 37 completed weeks of gestation. Antepartum hemorrhage served as the independent variable, and preterm birth as the dependent variable.

Statistical analyses were conducted using SPSS version 27.0. Bivariate analysis was performed using Fisher's exact test to assess the association between antepartum hemorrhage and preterm birth. Logistic regression was used to evaluate the association between antepartum hemorrhage and the risk of preterm birth and to estimate the corresponding odds ratio (OR) with a 95% confidence interval (CI). Statistical significance was set at $p < 0.05$.

Ethical approval was granted by the Research Ethics Committee of the Faculty of Medicine at Universitas Padjadjaran, Indonesia (Approval No. 408/UN6.KEP/EC/2024). Patient data were anonymized, and confidentiality was strictly maintained throughout the study.

Result

Table 1 summarizes the characteristics of the 102 study participants. The majority of pregnant women were within the optimal reproductive age group (20–35 years), accounting for 70 participants (68.63%). A substantial proportion were of advanced maternal age (>35 years), representing 32 participants (31.37%). Regarding parity, more than half of the study population consisted of multiparous women ($P \geq 2$), comprising 56 participants (54.90%).

The distribution of placental pathologies showed that placenta previa was the most common condition, affecting 82 participants (80.39%), followed by placenta accreta spectrum disorders in 65 participants

(63.73%). Placental abruption was relatively uncommon, occurring in only 2 participants (1.96%). These findings suggest a high burden of abnormal placentation in the study population. The high prevalence of severe placental disorders was reflected in pregnancy outcomes. Most participants were unable to carry to term and delivered preterm. A total of 76 women (74.51%) experienced preterm birth, whereas only 26 women (25.49%) delivered at term. This finding highlights the substantial contribution of antepartum hemorrhage and placental pathology to adverse pregnancy outcomes, particularly preterm birth.

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Cross-tabulation analysis showed that among the 42 women who experienced antepartum hemorrhage, most delivered preterm (39 cases; 92.9%), whereas only 3 (7.1%) delivered at term. In contrast, among the 60 women without antepartum hemorrhage, 37 (61.7%) delivered preterm and 23 (38.3%) delivered at term. Fisher's Exact Test yielded a p-value of 0.0004 ($p < 0.05$), indicating a statistically significant association between antepartum hemorrhage

Table 1 Characteristics of Study Participants

Characteristics	Category	Number (n)	Percentage (%)
Maternal Age	20–35 years (Optimal Reproductive Age)	70	68.63%
	>35 years (Advanced Maternal Age)	32	31.37%
Parity	Nulliparous (Po)	18	17.65%
	Primiparous (P1)	28	27.45%
	Multiparous (P ≥2)	56	54.90%
Birth Outcome by Gestational Age	Preterm	76	74.51%
	Aterm	26	25.49%
Cause of Hemorrhage / Placental Pathology*	Placenta Previa	82	80.39%
	Placenta Accreta Spectrum	65	63.73%
	Placental Abruptio	2	1.96%

*Participants may have had more than one placental pathology; therefore, percentages may exceed 100%.

Table 2 Association between Antepartum Hemorrhage and Preterm Birth at Dr. Hasan Sadikin General Hospital in Bandung in 2025

Antepartum Hemorrhage	Preterm Birth (n=76)	Term Birth (n=26)	Total(n=102)	p-value	OR (95% CI)
Ya	39 (92.2%)	3 (7.1%)	42 (100%)	0.0004 ^a	8.081
Tidak	37 (61.7%)	23 (38.3%)	60 (100%)		

Note:

^a Calculated using Fisher's Exact Test (Chi-square p-value = 0.0009). OR = Odds Ratio; CI = Confidence Interval

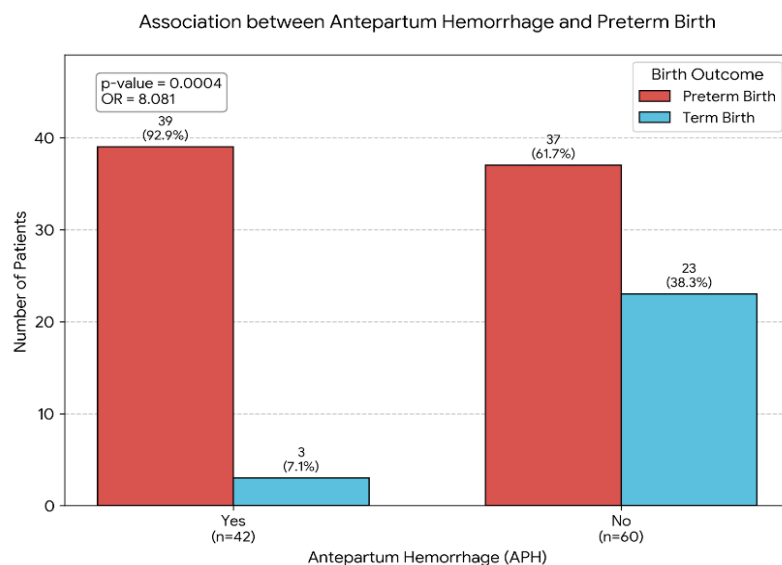
**Figure 1 Association Between Antepartum Hemorrhage and Preterm Birth**

Table 3 Logistic Regression between Antepartum Hemorrhage and Preterm Birth at Dr. Hasan Sadikin General Hospital, Bandung, 2025

Controlled Variable	Adjusted OR	95% Confidence Interval	p-value
Antepartum Hemorrhage (APH)	11.49	2.77 – 47.68	0.001
Previous Cesarean Section (CS)	2.03	0.45 – 9.10	0.353
Preeclampsia / Hypertension	1.35	0.27 – 6.70	0.715
High-Risk Maternal Age (<20 or ≥35 years)	1.20	0.42 – 3.43	0.729
High-Risk Parity (0 or >3)	0.51	0.12 – 2.15	0.360

and preterm birth at Dr. Hasan Sadikin General Hospital, Bandung, in 2025.

Furthermore, the calculated odds ratio (OR) was 8.081 (95% CI: 2.237–29.195). This finding indicates that women with antepartum hemorrhage had approximately eight times the odds of preterm birth compared with women without antepartum hemorrhage. The 95% confidence interval did not include unity, confirming the statistical significance and reliability of the estimated association.

Figure 1 shows that mothers with antepartum hemorrhage (APH) had a markedly higher proportion of preterm deliveries (92.9%) than those without APH (61.7%). This association was statistically significant ($p = 0.0004$), with an odds ratio of 8.081, indicating that APH substantially increased the likelihood of preterm birth.

Further analysis using logistic regression is presented in Table 3. After adjusting for maternal age, parity, previous cesarean section, and preeclampsia/hypertension, APH remained an independent and significant predictor of preterm birth (adjusted OR 11.49; 95% CI 2.77–47.68; $p = 0.001$). None of the other maternal risk factors showed a statistically significant association with preterm delivery.

Discussion

Based on data from 102 study subjects at Dr. Hasan Sadikin General Hospital (RSHS), Bandung, in 2025, strong empirical

evidence was identified regarding the clinical association between antepartum hemorrhage (APH) and preterm birth outcomes. The findings presented in Table 2 indicate that among the 42 pregnant women who experienced active antepartum hemorrhage, 39 cases (92.8%) resulted in preterm delivery, whereas only 3 cases (7.2%) were able to maintain pregnancy until term. In contrast, among women who did not experience active bleeding despite having underlying placental pathology, the incidence of preterm birth was considerably lower, accounting for 37 cases out of a total of 60 subjects (61.7%). This marked difference in proportions confirms that antepartum hemorrhage is a major clinical predictor of increased risk of preterm birth.^{1,3}

Similar findings were reported in a retrospective cohort study from Northern Ethiopia, which found that antepartum hemorrhage was significantly associated with a higher likelihood of preterm delivery (ARR = 3.9; 95% CI: 2.8–5.6). The study also reported a higher incidence of adverse perinatal outcomes among mothers with APH, supporting the present findings that antepartum hemorrhage may substantially contribute to unfavorable pregnancy outcomes.¹²

This mechanism is supported by prior literature suggesting that decidual hemorrhage and thrombosis may be important pathways in the pathogenesis of preterm birth. Decidual bleeding may trigger a pro-inflammatory

cascade that activates prostaglandins and matrix metalloproteinases, leading to cervical remodeling, membrane weakening, and uterine contractions that ultimately precipitate spontaneous preterm labor or premature rupture of membranes.¹³ These mechanisms may lead to spontaneous preterm labor or premature rupture of membranes in patients experiencing antepartum hemorrhage.

In addition to these biological mechanisms, the high incidence of preterm birth observed in this study may also have been influenced by medically indicated termination of pregnancy (iatrogenic preterm birth). The World Health Organization has reported that a substantial proportion of preterm births occur as a consequence of pregnancy complications requiring labor induction or cesarean delivery before 37 weeks of gestation to preserve maternal and fetal well-being.¹¹ In cases of severe antepartum hemorrhage, particularly those associated with placenta previa or placenta accreta spectrum disorders, the risks of hemorrhagic shock, the need for blood transfusion, coagulation abnormalities, and fetal hypoxia frequently constitute major indications for immediate delivery. Previous obstetric guidelines have shown that pregnancies complicated by placenta previa and placenta accreta spectrum disorders often require medically indicated preterm delivery to reduce the risks of severe hemorrhage and maternal-fetal compromise. In placenta accreta spectrum, planned delivery before the onset of labor or significant bleeding is frequently recommended, as delayed delivery may increase the risk of emergency intervention due to massive hemorrhage.¹⁴ Therefore, the association between antepartum hemorrhage and preterm birth may arise not only through inflammatory pathways that trigger spontaneous labor but also through clinical decision-making processes that necessitate early termination of pregnancy to prevent maternal and perinatal

morbidity and mortality.^{11,15}

The high proportion of preterm births observed in this study may be influenced by Dr. Hasan Sadikin General Hospital, a tertiary referral center that manages high-risk pregnancies and severe obstetric conditions. This referral pattern may increase the proportion of medically indicated preterm deliveries and introduce referral bias. Consequently, the findings may overestimate the true incidence of preterm birth in the general obstetric population and should be interpreted cautiously regarding generalizability.

The observed association between antepartum hemorrhage and preterm birth may be influenced by several confounders, including maternal age, parity, history of preterm birth, antenatal care utilization, and comorbidities such as preeclampsia, gestational hypertension, and diabetes mellitus. The type of placental abnormality and bleeding characteristics may also affect outcomes. Although multivariate analysis was performed, residual confounding cannot be ruled out because of limitations in the completeness of secondary data.

This study has several limitations, including its retrospective design using secondary medical record data, which may introduce information bias, incomplete documentation, and possible misclassification of variables. Selection bias may also arise from including only complete records, and residual confounding cannot be ruled out because some clinical variables, such as severity and timing of bleeding, were not available. In addition, the single-center setting may limit generalizability. Despite these limitations, the findings underscore the clinical importance of early identification and close monitoring of pregnant women with antepartum hemorrhage, as well as timely referral and appropriate obstetric management to reduce the risk of preterm birth and improve maternal and neonatal

outcomes.

Conclusion

Antepartum hemorrhage is significantly associated with an increased risk of preterm birth. Women with antepartum hemorrhage were more likely to experience preterm delivery than those without it. However, this association should be interpreted cautiously given the observational design and potential residual confounding. These findings underscore the importance of early recognition and appropriate management of antepartum hemorrhage to reduce the risk of preterm birth and improve maternal and neonatal outcomes.

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