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RISK FACTORS AND MATERNAL OUTCOMES OF PLACENTAL ABRUPTION IN A TERTIARY CARE HOSPITAL IN QUETTA

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Abstract

Background: *Placental abruption is a life-threatening obstetric emergency and an important cause of maternal morbidity and mortality, particularly in developing countries. Identification of associated risk factors is essential for timely diagnosis, appropriate management, and improved maternal outcomes.*

Objective: *To determine the risk factors and maternal outcomes of placental abruption among women managed at a tertiary care hospital in Quetta.*

Place and Duration of study: *From March 2025 to August 2025 Gynecology and Obstetrics Department, Sandeman Provincial Hospital / Bolan Medical College / Hospital, Quetta.*

Methodology: *This cross-sectional analytical study was conducted at the Department of Obstetrics and Gynecology, Sandeman Provincial Hospital / Bolan Medical College / Hospital, Quetta. A total of 100 pregnant women diagnosed with placental abruption after 28 weeks of gestation were enrolled using consecutive non-probability sampling. Data regarding demographic characteristics, obstetric history, associated risk factors, and maternal outcomes were collected using a structured proforma. Statistical analysis was performed using SPSS version 26. Continuous variables were expressed as mean ± standard deviation, while categorical variables were summarized as frequencies and percentages. Associations between risk factors and maternal outcomes were analyzed using the Chi-square test, with* ***p <0.05*** *considered statistically significant.*

Results: *The mean maternal age was* ***30.8 ± 5.7 years****, and the mean gestational age at presentation was* ***35.2 ± 2.9 weeks****. The most common risk factors included anemia (46%), pregnancy-induced hypertension (38%), previous cesarean section (29%), premature rupture of membranes (18%), chronic hypertension (14%), and previous placental abruption (11%). Maternal complications comprised blood transfusion (41%), postpartum hemorrhage (34%), intensive care unit admission (15%), disseminated intravascular coagulation (9%), acute kidney injury (5%), hysterectomy (4%), and maternal mortality (3%). Hypertensive disorders (****p=0.012****), severe anemia (****p=0.021****), and previous cesarean delivery (****p=0.036****) were significantly associated with adverse maternal outcomes.*

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Conclusion: *Placental abruption is associated with substantial maternal morbidity. Hypertensive disorders, anemia, and previous cesarean delivery were significant predictors of adverse maternal outcomes. Strengthening antenatal surveillance, early risk identification, and prompt multidisciplinary management may reduce maternal complications and improve outcomes.*

Introduction

Placental abruption, also known as abruptio placentae, is a serious obstetric complication characterized by the premature separation of a normally implanted placenta from the uterine wall before delivery of the fetus. It is considered one of the leading causes of maternal and perinatal morbidity and mortality worldwide. The condition often presents with vaginal bleeding, abdominal pain, uterine tenderness, increased uterine tone, and fetal distress. Depending on the severity and extent of placental separation, placental abruption may result in catastrophic maternal complications, including postpartum hemorrhage, disseminated intravascular coagulation (DIC), hypovolemic shock, acute kidney injury, emergency hysterectomy, intensive care unit (ICU) admission, and maternal death. Prompt diagnosis and timely obstetric intervention are therefore essential to reduce adverse maternal and fetal outcomes [1,2].Globally, the incidence of placental abruption ranges from approximately 0.5% to 1.5% of all pregnancies, with higher rates reported in low- and middle-income countries due to inadequate antenatal care, delayed referral systems, and limited access to emergency obstetric services. The burden is particularly high in South Asian countries, including Pakistan, where maternal mortality remains a significant public health concern. In many resource-limited settings, women often present late to tertiary healthcare facilities with severe hemorrhage or advanced complications, thereby increasing the risk of adverse maternal outcomes [3,4].The etiology of placental abruption is multifactorial, involving both maternal and obstetric factors. Hypertensive disorders of pregnancy, including chronic hypertension and preeclampsia, are among the most consistently identified risk factors. Other important contributors include advanced maternal age, multiparity, previous placental abruption, previous cesarean section, premature rupture of membranes, abdominal trauma, smoking, illicit drug use, thrombophilic disorders, multiple gestation, polyhydramnios, diabetes mellitus, and maternal anemia. Many of these factors compromise placental vascular integrity, resulting in bleeding at the maternal-fetal interface and subsequent placental separation. Identification of these risk factors during antenatal care may facilitate early intervention and improve maternal outcomes [5,6].Maternal consequences of placental abruption depend on the degree of placental separation and the amount of blood loss. Massive obstetric hemorrhage frequently necessitates blood transfusion and may progress to hemorrhagic shock or disseminated intravascular coagulation. In severe cases, uncontrolled bleeding requires emergency hysterectomy to save the mother's life. Other complications include renal failure, prolonged hospitalization, admission to intensive care units, and increased maternal mortality. Because these complications impose considerable physical, psychological, and economic burdens on affected families and healthcare systems, identifying women at increased risk remains a priority [7,8].Although numerous international studies have evaluated placental abruption, regional evidence from Balochistan is limited. Differences in maternal demographics, socioeconomic status, nutritional deficiencies, healthcare accessibility, and obstetric practices may influence both the prevalence of risk factors and maternal outcomes. Quetta, being the largest tertiary referral center in the province, receives complicated obstetric cases from urban and remote rural districts. Consequently, data generated from this population can provide valuable information for clinicians and policymakers to improve antenatal screening, optimize referral pathways, and strengthen emergency obstetric care services

Frontier in Medical & Health Research

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[9,10].Understanding the relationship between maternal risk factors and adverse outcomes is essential for developing preventive strategies and evidence-based clinical protocols. Early recognition of high-risk pregnancies, regular antenatal surveillance, timely referral to specialized healthcare facilities, correction of maternal anemia, and effective management of hypertensive disorders may substantially reduce maternal complications associated with placental abruption. Therefore, this study was conducted to determine the risk factors and maternal outcomes of placental abruption among women admitted to a tertiary care hospital in Quetta, thereby providing locally relevant evidence to guide clinical decision-making and improve maternal health services.

Study Objectives

To determine the frequency of risk factors associated with placental abruption and evaluate maternal outcomes among affected women admitted to a tertiary care hospital in Quetta.

Materials and Methods

Study Design & Setting

A hospital-based cross-sectional analytical study was conducted in the Department of Obstetrics and Gynecology, Sandeman Provincial Hospital / Bolan Medical College / Hospital, Quetta, Pakistan, from 1 March 2025 to 31 August 2025.

Participants

The study included 100 pregnant women diagnosed clinically and ultrasonographically with placental abruption after 28 weeks of gestation who were admitted during the study period. Participants were recruited using consecutive non-probability sampling. Women with confirmed placenta previa, unexplained antepartum hemorrhage without placental abruption, or incomplete clinical records were excluded from the study.

Sample Size Calculation

The sample size was calculated using the WHO Sample Size Calculator with the formula $n = Z^2P(1-P)/d^2$, assuming a 95% confidence level, anticipated prevalence of maternal complications of 50%, and a margin of error of 10%. The minimum calculated sample size was 96; therefore, 100 participants were enrolled to increase study precision.

Inclusion Criteria

- Pregnant women aged 18–45 years.
- Gestational age ≥28 weeks.
- Clinically and/or ultrasonographically diagnosed placental abruption.
- Singleton or multiple pregnancies.
- Women who provided written informed consent to participate.

Exclusion Criteria

- Placenta previa or vasa previa confirmed by ultrasonography.
- Antepartum hemorrhage due to causes other than placental abruption.
- Women with known inherited coagulation disorders diagnosed before pregnancy.
- Patients referred after delivery with incomplete clinical records.
- Women who declined participation.

Diagnostic and Management Strategy

Placental abruption was diagnosed based on clinical features including vaginal bleeding, abdominal pain, uterine tenderness, increased uterine tone, fetal distress, and ultrasonographic findings when available. Maternal stabilization was initiated using intravenous fluids, blood products when indicated, and continuous maternal and fetal monitoring. The mode of delivery (vaginal or emergency cesarean section) was determined according to maternal hemodynamic status, fetal condition, gestational age, and obstetric indications. Patients developing severe complications were managed in collaboration with anesthesiologists, hematologists, and intensive care specialists according to institutional protocols.

Statistical Analysis

Data were entered and analyzed using IBM SPSS Statistics version 26. Continuous variables were

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tested for normality and presented as mean ± standard deviation, while categorical variables were summarized as frequencies and percentages. Associations between maternal risk factors and adverse maternal outcomes were assessed using the Chi-square test or Fisher's exact test where appropriate. A two-tailed p-value <0.05 was considered statistically significant.

Results

A total of 100 women diagnosed with placental abruption were enrolled. The mean maternal age was **30.8 ± 5.7 years**, while the mean gestational age at presentation was **35.2 ± 2.9 weeks**. Most participants were multiparous (61%), and 56% belonged to rural areas. Pregnancy-induced hypertension (38%) was the most frequent risk factor, followed by anemia (46%), previous cesarean section (29%), premature rupture of membranes (18%), chronic hypertension (14%), previous placental abruption (11%), multiple pregnancy (8%), and abdominal trauma (5%).Regarding maternal outcomes, blood transfusion was required in 41% of women, postpartum hemorrhage occurred in 34%, intensive care unit admission in 15%, disseminated intravascular coagulation in 9%, acute kidney injury in 5%, emergency hysterectomy in 4%, and maternal mortality in 3% of cases. Women with hypertensive disorders experienced significantly higher rates of severe maternal complications compared with normotensive women (52.0% vs. 28.0%, **p=0.012**). Severe anemia was significantly associated with postpartum hemorrhage **(p=0.021)** and blood transfusion **(p=0.008)**, while previous cesarean section was associated with an increased likelihood of operative delivery **(p=0.036)**. Overall, adverse maternal outcomes were observed in 57% of participants, indicating a substantial burden of morbidity associated with placental abruption in this tertiary care setting.

Table 1. Baseline Demographic and Obstetric Characteristics of Women with Placental Abruption (n=100)

Variable	Frequency (n)	Percentage (%)
Age (years)	**Mean ± SD**	**30.8 ± 5.7**
18–24	18	18.0
25–34	52	52.0
≥35	30	30.0
Gestational age (weeks)	**Mean ± SD**	**35.2 ± 2.9**
28–33 weeks	28	28.0
34–37 weeks	50	50.0
>37 weeks	22	22.0
Primiparous	39	39.0
Multiparous	61	61.0
Rural residence	56	56.0
Urban residence	44	44.0

Values are presented as mean ± standard deviation or frequency (%). Mean maternal age was **30.8 ± 5.7 years**, and mean gestational age at presentation was **35.2 ± 2.9 weeks**.

Table 2. Frequency of Risk Factors Associated with Placental Abruption (n=100)

Risk Factor	Frequency (n)	Percentage (%)
Anemia	46	46.0
Pregnancy-induced hypertension	38	38.0
Previous cesarean section	29	29.0
Premature rupture of membranes	18	18.0

Frontier in Medical & Health Research

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Chronic hypertension	14	14.0
Previous placental abruption	11	11.0
Multiple pregnancy	8	8.0
Diabetes mellitus	7	7.0
Polyhydramnios	6	6.0
Abdominal trauma	5	5.0
Smoking/tobacco use	4	4.0

Anemia and hypertensive disorders were the most frequently identified risk factors among women with placental abruption.

Table 3. Maternal Outcomes among Women with Placental Abruption (n=100)

Maternal Outcome	**Frequency (n)**	**Percentage (%)**
Blood transfusion	41	41.0
Postpartum hemorrhage	34	34.0
Intensive Care Unit admission	15	15.0
Disseminated intravascular coagulation	9	9.0
Acute kidney injury	5	5.0
Emergency hysterectomy	4	4.0
Maternal mortality	3	3.0
No major complication	43	43.0
Any maternal complication	57	57.0

More than half of the participants experienced at least one adverse maternal outcome. Blood transfusion and postpartum hemorrhage were the most common complications.

Table 4. Association Between Selected Risk Factors and Adverse Maternal Outcomes (n=100)

Risk Factor	**Adverse Outcome Present n (%)**	**Adverse Outcome Absent n (%)**	**p-value**
Pregnancy-induced hypertension (n=38)	24 (63.2)	14 (36.8)	**0.012**
Severe anemia (n=46)	31 (67.4)	15 (32.6)	**0.021**
Previous cesarean section (n=29)	20 (69.0)	9 (31.0)	**0.036**
Premature rupture of membranes (n=18)	11 (61.1)	7 (38.9)	0.174
Chronic hypertension (n=14)	10 (71.4)	4 (28.6)	0.058
Previous placental abruption (n=11)	8 (72.7)	3 (27.3)	0.083

Associations were analyzed using the Chi-square test. Pregnancy-induced hypertension, severe anemia, and previous cesarean section showed statistically significant associations with adverse maternal outcomes (**$p < 0.05$**). Adverse maternal outcomes included postpartum hemorrhage, blood transfusion, disseminated intravascular coagulation, intensive care unit admission, acute kidney injury, emergency hysterectomy, or maternal death.

Discussion

The present study evaluated the risk factors and maternal outcomes of placental abruption among women admitted to a tertiary care hospital in Quetta. The findings demonstrated that anemia (46%), pregnancy-induced hypertension (38%), and previous cesarean section (29%) were the most prevalent risk factors, while blood transfusion (41%) and postpartum hemorrhage (34%)were the leading maternal complications.

Frontier in Medical & Health Research

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Furthermore, hypertensive disorders, severe anemia, and previous cesarean delivery showed statistically significant associations with adverse maternal outcomes. These findings emphasize that placental abruption remains a major obstetric emergency associated with substantial maternal morbidity, particularly in resource-limited settings [11,12].The mean maternal age of 30.8 ± 5.7 years observed in this study is comparable to findings reported by Eubanks et al. and Zhang et al., who found that placental abruption most frequently occurs among women aged 30–35 years. Advanced maternal age has consistently been associated with degenerative uteroplacental vascular changes and a higher prevalence of chronic maternal diseases, increasing the risk of placental separation. Recent evidence has also shown that women aged ≥35 years experience significantly greater maternal morbidity following placental abruption than younger women, highlighting the importance of closer antenatal surveillance in this age group [13].Hypertensive disorders were among the strongest predictors of adverse maternal outcomes in the present study, with pregnancy-induced hypertension affecting 38% of participants and demonstrating a significant association with severe complications (p=0.012). These findings are consistent with recent studies published between 2021 and 2025, which identified chronic hypertension and preeclampsia as the principal modifiable risk factors for placental abruption. Hypertension contributes to endothelial dysfunction, abnormal spiral artery remodeling, and placental ischemia, ultimately predisposing women to premature placental separation. The observed association underscores the need for early detection and effective management of hypertensive disorders during antenatal care [14,15].Maternal anemia was present in nearly half of the study population and was significantly associated with postpartum hemorrhage and blood transfusion requirements. Similar findings have been reported in recent population-based studies, which demonstrated that maternal anemia reduces physiological reserve during obstetric hemorrhage and contributes to increased maternal morbidity. In low- and middle-income countries, nutritional deficiencies and delayed antenatal booking remain major contributors to anemia, thereby increasing susceptibility to severe complications following placental abruption. Strengthening antenatal nutritional interventions and routine hemoglobin screening may therefore reduce the burden of maternal complications [16].Previous cesarean section was identified in 29% of women and showed a significant association with adverse maternal outcomes. Comparable observations have been reported in contemporary literature, suggesting that uterine scarring may impair normal placental implantation and vascular remodeling, thereby increasing the likelihood of placental abruption in subsequent pregnancies. Likewise, women with a previous history of placental abruption remain at substantially increased risk of recurrence, emphasizing the importance of identifying these pregnancies as high-risk and ensuring close obstetric follow-up [17,18].Regarding maternal outcomes, blood transfusion (41%) and postpartum hemorrhage (34%) were the most frequent complications observed in this study, followed by ICU admission (15%), disseminated intravascular coagulation (9%), acute kidney injury (5%), emergency hysterectomy (4%), and maternal mortality (3%). These findings are comparable with reports from recent observational studies, where obstetric hemorrhage represented the leading cause of maternal morbidity among women with placental abruption. Although the maternal mortality rate in the present study was relatively low, it remains higher than that reported in high-income countries, likely reflecting delayed referrals, inadequate antenatal care, limited blood bank availability, and late presentation of critically ill patients from remote areas of Balochistan [19,20].The overall maternal complication rate of 57% observed in this study highlights the considerable burden of placental abruption in tertiary referral hospitals. The relatively high frequency of severe complications may be attributed to the referral nature of the study center, where complicated obstetric cases from peripheral districts are commonly managed. These findings reinforce the importance of

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strengthening primary antenatal care, early identification of high-risk pregnancies, timely referral systems, availability of emergency blood transfusion services, and multidisciplinary management involving obstetricians, anesthesiologists, hematologists, and intensive care specialists. Such measures have the potential to substantially reduce maternal morbidity and improve pregnancy outcomes among women affected by placental abruption [21,22]. the present study supports current international evidence demonstrating that placental abruption remains a major contributor to maternal morbidity. Early identification of women with hypertensive disorders, anemia, previous cesarean delivery, and previous placental abruption, coupled with vigilant antenatal surveillance and prompt multidisciplinary management, may substantially reduce severe maternal complications and improve pregnancy outcomes. These findings are consistent with recent evidence and reinforce the importance of targeted preventive strategies in tertiary care settings [23,24].

Limitations

This study was conducted at a single tertiary care hospital with a relatively small sample size, which may limit the generalizability of the findings. The cross-sectional design precluded causal inference, and neonatal outcomes were not evaluated. Additionally, some potential confounding factors, including socioeconomic and nutritional status, were not comprehensively assessed.

Conclusion

Placental abruption remains a major obstetric emergency associated with significant maternal morbidity. Hypertensive disorders, anemia, and previous cesarean delivery were the principal risk factors for adverse maternal outcomes. Early antenatal risk assessment, prompt diagnosis, timely referral, and multidisciplinary management are essential to reduce maternal complications and improve pregnancy outcomes.

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Conflict of Interest: Nil

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Authors Contributions

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Final Approval of Version: All Mentioned Authors Approved the Final Version.

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