INTERNATIONAL JOURNAL OF SOCIAL HEALTH
https://ijsh.ph/index.php/rp
**Volume 3 Number 12 December 2024** E-ISSN: 2984-7079

# Abruptio Placentae and its Relations to Maternal and Neonatal Outcomes: A Narrative Review of Recent Literature

**Esrani Rosmawati Manurung[1], Ernawati[2], Mahendra Tri Arif Sampurna[3]**
Universitas Airlangga, Surabaya, Indonesia[1,2,3]
Email: esrani.rosmawati.manurung-2018@fk.unair.ac.id[1], ernawati@fk.unair.ac.id[2]*, mahendra.tri@fk.unair.ac.id[3]

**KEYWORDS**
Placental abruption, maternal, fetal, outcome, prevention

**ABSTRACT**
Placental abruption (PA) is the premature separation of the placenta from the uterine wall, typically occurring after 20 weeks of gestation. Affecting approximately 1.4% of pregnancies, PA poses significant risks to both maternal and fetal health, including life-threatening complications and increased mortality. The etiology of PA involves chronic and acute pathways such as vasculopathy, inflammation, and oxidative stress, often exacerbated by risk factors like maternal hypertension, advanced age, smoking, and a history of prior abruption. This review aims to explore the multifactorial nature of placental abruption, improving understanding of its diagnosis, management, and prevention strategies. A comprehensive review of the literature was conducted, focusing on the clinical presentation, diagnostic methods, management approaches, and preventive strategies related to placental abruption. Results show diagnosis of PA is primarily clinical, with symptoms including vaginal bleeding, abdominal pain, and uterine contractions, confirmed post-delivery. While ultrasonography is used in diagnosis, its limitations have prompted the use of advanced imaging techniques. Management ranges from expectant monitoring to emergency cesarean delivery, depending on severity. PA is associated with increased risks of postpartum hemorrhage, infection, maternal death, preterm birth, low fetal birth weight, and neonatal respiratory distress. Preventive strategies targeting hypercoagulability with anticoagulants remain inconclusive and are generally not recommended. Lifestyle interventions show potential but require further investigation. The review underscores the importance of understanding PA's multifactorial nature to improve current diagnostic, management, and preventive approaches. Further research into novel interventions is essential for better outcomes.

DOI:

**Corresponding Author:** Esrani Rosmawati Manurung
**Email:** esrani.rosmawati.manurung-2018@fk.unair.ac.id

## INTRODUCTION

Placental abruption, or *abruptio placentae*, is the condition characterized by the complete or partial separation of the placenta from the uterine wall. This complication typically occurs after the twentieth week of gestation and prior to fetal delivery (Bączkowska et al. 2022). It is observed in approximately 1.4% of all pregnancies, with a complication rate ranging between 0.6% and 1.2% (Kovo and Schreiber 2021). The presence of *placental abruption* is critical and potentially life-threatening, as it can result in severe maternal morbidity and mortality, as well as increased fetal mortality (Bączkowska et al. 2022).

The clinical manifestations of *placental abruption* include sudden vaginal bleeding, abdominal pain, and uterine contractions, with definitive diagnosis often made post-delivery. This condition presents significant obstetric and fetal challenges due to excessive maternal hemorrhage and the

urgency of medical intervention (Brandt and Ananth 2023). Even mild cases can escalate rapidly, contributing to a wide range of complications. Therefore, a comprehensive understanding of the condition—including its pathoetiology, diagnosis, management strategies, complications, and prevention—is essential.

Although numerous studies have investigated *placental abruption*, there remains a need for updated reviews, particularly those focusing on maternal and fetal outcomes and contemporary prevention strategies. This narrative review centers on the outcomes of *placental abruption* in both mothers and fetuses, exploring their associations with risk factors, underlying pathophysiological mechanisms, current management approaches, and preventive measures.

Bączkowska et al. (2022) investigated the clinical features and risks of *placental abruption*, emphasizing its profound impact on maternal and fetal health. While their study provides a comprehensive overview of clinical presentation and complications, it lacks emphasis on emerging preventive strategies and treatment innovations. This highlights the necessity for continued research into novel approaches for managing and preventing the condition. In contrast, Kovo and Schreiber (2021) examined the epidemiology and risk factors, identifying hypertension and advanced maternal age as key contributors. However, their research did not explore recent advancements in diagnostic technologies or updated therapeutic protocols.

Accordingly, this review aims to address these gaps by offering an integrative perspective on *placental abruption*, encompassing risk factor analysis, diagnostic evolution, and the latest in management and prevention. By doing so, it seeks to contribute to improved clinical practices and better health outcomes for both mothers and their infants.

## METHOD

In December 2024, we conducted this narrative review utilizing five databases (*PubMed*, *SCOPUS*, *Cochrane*, *DOAJ*, and *ProQuest*) using keywords such as *"abruptio placentae," "maternal outcomes," "fetal outcomes,"* and related synonyms. The inclusion criteria for articles selected in this narrative review were: research articles (ideally clinical trials, randomized controlled trials, or systematic reviews) published in English within the past ten years, except for topics with no recent publications. Articles that were unavailable in full text or lacked clearly defined objectives were excluded. The review was conducted independently by three authors, and reference lists were examined to ensure thoroughness.

## RESULT AND DISCUSSION

### *Etiology, Risk Factors, and Pathophysiology*

The exact etiology of placental abruption is currently unknown (Li et al. 2019). However, some risk factors have been identified in relation to placental abruption, with studies varying in results. One of the risk factors that has been found to be consistent among studies is the history of placental abruption in previous pregnancy, which is further found to further heighten the risk in cases of history of multiple placental abruptions (Bączkowska et al. 2022; Hiersch et al. 2017). Cases of hypertensive disorders such as chronic hypertension and pre-eclampsia has also been found to be significant risk factor for placental abruption (Bączkowska et al. 2022; Nkwabong, Tchomguie Moussi, and Fouedjio 2023). History of maternal chronic illness has also been found to be relevant with previous studies consistent of hormonal (thyroid) or gynecologic diseases correlating to the presence of placental abruption, which also influences the pregnancy outcome altogether (Maraka et al. 2016; Mills et al. 2020). Studies have also found that maternal lifestyle correlates with the risk of placental abruption, with the cases of

underweight, alcohol drinking, passive and/or active smoking, and also transportation modalities being significant in correlation to the incidence of placental abruption (Adane et al. 2019; Nkwabong et al. 2023; Odendaal et al. 2020). Other conditions co-existing during pregnancy such as placenta previa and polyhydramnios have also been found to significantly heighten the risk of placental abruption during pregnancy (Baumfeld et al. 2017; Khazaei and Jenabi 2020). Other risk factors such as high parity, advanced maternal age, and abdominal trauma has also been identified in correlation to placental abruption (Bączkowska et al. 2022; Li et al. 2019).

Placental abruption pathophysiology corroborates two different aspects from time periods, which consists of long-standing "chronic" process and "acute" triggers, of which the interaction of both time periods causes the condition altogether (Brandt and Ananth 2023). The "chronic" pathway consisting of factors predisposing the condition such as thrombosis, vasculopathy in the decidua and uteroplacental, infection, and also inflammation; all of which causes the insufficiency and dysfunction of the placenta (Brandt and Ananth 2023; Kovo and Schreiber 2021). The "acute" pathway is related to the inflammation process, of which inflammatory mediators such as macrophages, activators, and cytokines (interleukin-1 and tumor necrosis factor-alpha) are produced and thus act at the maternal-fetal interface. These mediators induce the production and activation of metalloproteinases, which in turn weakens and destructs the interaction of which placental attachment happens (Kovo and Schreiber 2021). Both of these pathway result in oxidative stress in the placenta, which leads to hypoxia that promote the expression of vascular endothelial growth factors (VEGF), further altering the inflammatory response to decidual bleedings, especially in cases of other placentally mediated diseases (Brandt and Ananth 2023).

***Diagnosis and Management***

The diagnosis of placental abruption is done clinically by signs and symptoms, which is further confirmed after delivery by evaluation of the presence of retroplacental clots or the depression in the "maternal" surface of the placenta (Shinde et al. 2016). Typically patients with placental abruption presents with symptoms such as "colicky" lower abdominal pain and vaginal bleeding (Jyotsna et al. 2023). Other symptoms noted are the presence of contraction of the uterus and the abnormalities of fetal heart pattern. The onset of vaginal bleeding and abdominal pain are commonly abrupt (Bruinsma et al. 2022). Physical examination of a patient suspected of placental abruption consist of palpation of the uterus to find tenderness, consistency, and also to note the contractions' duration and frequency. Further digital examination of cervix is delayed until ultrasonography is obtained for the localization of placenta and the exclusion of placenta previa diagnosis (Mishra and Misra 2019). Ultrasonography examination of the condition has been found to be of poor sensitivity and reliability, as abruption may show as negative findings on ultrasonography. However, on cases with positive findings of the placenta abruption, the placenta might be found in different findings depending on the size, location of bleeding, the time of abruption, and also the time of ultrasound examination (Shinde et al. 2016). However, newer technologies surrounding ultrasonography such as superb microvascular imaging (SMI) with minimal motion artifact and visualized low-velocity blood flow have been found to lead to a more accurate diagnosis and prompt treatment in recent years (Suzuki et al. 2022). Fetal heart monitoring has also been found to be helpful in diagnosing placental abruption, with previous study finding significant differences detected between patients of placental abruption (Qiu et al. 2021).

The management of placental abruption varies upon the degree of the severity. In cases of mild placental abruption, vaginal delivery seems to be an option of choice. However, in cases of more severe placental abruption, cesarean section is a more sensible choice (Li et al. 2019:62). The management of

the abruption, even on its mild condition should be rendered to be of expectant approach, as the condition might progress into severe abruption, which was found in previous study to be in 35% of cases, which was correlated with oligohydramnios on initial presentation (Heerboth et al. 2023). Especially in cases of emergency with severe placental abruption or caused by trauma, pregnancy termination should be considered with the consideration of fetal outcome, maternal outcome, comorbidities, and overall risk-and-benefit of the termination itself (Li et al. 2019:62; Page et al. 2020).

***Maternal Outcomes***

Maternal outcomes of placental abruption can be classified into the short-term and long-term maternal outcomes. The morbidity of the delivery itself, especially in cases of cesarean delivery, has been found to be consistently higher in patients with placenta abruption, with 3.5—31.1 times higher risk of relaparotomy after a cesarean section surgery. This has been postulated to be correlated by the presence of higher risk of coagulation disorder, causing disseminated intravascular coagulation in patients of placental abruption (Amikam et al. 2024; Katheryne L. Downes, Grantz, and Shenassa 2017). Postpartum hemorrhage has also been found to be higher in cases of placental abruption, albeit the inconsistency in previous studies with the risk ranging from 1.62—17.9 times higher in cases of abruption. In concordance, anemia and the risk of transfusion is higher in cases of vaginal delivery (Katheryne L. Downes et al. 2017; Kinoshita et al. 2014). As such, risk of secondary postpartum infection has been found to be higher in cases of placental abruption. On the long term, the risk of maternal mortality has been found to be elevated in cardiovascular and non-cardiovascular causes, aligning with the pathophysiology surrounding both cases (Katheryne L. Downes et al. 2017).

***Neonatal Outcomes***

The most commonly found outcome of placental abruption in the fetus is preterm birth, which occurs in 40—60% cases of placental abruption. The separation of placenta has been postulated to irritate the uterine lining, stimulating the contraction that progresses into preterm labor (Katheryne L. Downes et al. 2017; Zhang et al. 2024). Lower fetal weight has also been found to correlate with placental abruption, with studies finding of 2—40% of placental abruption cases (Katheryne L. Downes et al. 2017). The presence of both placental abruption and intrauterine growth restriction has been found to have poor prognosis (poorer Apgar score, poor weight) on newborns, especially in cases of the disease co-existing with other ischemic placental diseases (Ni, Wang, and Cheng 2021). The presence of placental abruption has also been found to be significantly correlated to higher risk of neonatal asphyxia, respiratory distress, and also fetal mortality, which all could be traced back to the elevated risk of preterm birth and intrauterine growth restriction which causes fetal immaturity (Katheryne L Downes, Shenassa, and Grantz 2017).

***Prevention***

Prevention of placental abruption, as aligns with other placenta-mediated pregnancy complications have been corelated to thrombophilia and its relations to the hypercoagulable state affecting the “chronic” pathway stated earlier as the pathophysiology of placenta abruption. However, the relationship is still a controversy in today’s research and needs further studies, with studies finding factors such as factor V Leiden mutation, protein C, protein S, and antithrombin being related to placental abnormalities, albeit in only “modest” correlation (Skeith, Blondon, and Ní Áinle 2020). The use of anticoagulants, such as aspirin or low-molecular-weight heparin (LMWH) as prophylaxis has been used commonly to “prevent” placenta-mediated pregnancy complication. However, studies have

found that the use of LMWH specifically as a prevention of further placental abruption in patients with a history of the disease is not recommended until confirmatory data is available. The use of this medication has been found to have no additional benefit in preventing placenta-mediated complications (Skeith and Rodger 2017). Aspirin has been used at the dose of 60 miligrams per day to prevent preeclampsia, and previous study found that the use of the medication at daily dose of at least 100 miligrams for prevention of preeclampsia initiated at less than 16 weeks of gestational age might decrease the risk of placental abruption. However, the use of anticoagulants still needs further studies to determine the risk-and-benefit of the drug, especially in cases of placental abruption (Roberge, Bujold, and Nicolaides 2018).

Another approach for prevention is directed at other risk factors, which includes overall lifestyle of the patient itself. The role of lifestyle modification approach has been studied in other obstetrics conditions such as preeclampsia, which recommends lifestyle interventions such as exercising, smoking and alcohol consumption cessation, diet regulation, et cetera that has been found to reduce the incidence of preeclampsia (Parker, Hofstee, and Brennecke 2024). The role of lifestyle modification has yet to be studied in the case of placental abruption due to its main confounding risk factor being the history of the disease in previous pregnancy. However, in cases of primigravida patients, lifestyle intervention might be a feasible approach to avoid the risk of placental abruption during pregnancy.

## CONCLUSION

*Placental abruption* is a condition in which the placenta is prematurely separated from its uterine attachment prior to delivery, influenced by both chronic and acute processes. Risk factors associated with the condition include maternal age, maternal lifestyle, hypertensive disorders, other placental abnormalities, and, most significantly, a prior history of *placental abruption*. Diagnosis is primarily clinical, with confirmation often made post-delivery, and management is individualized based on a careful assessment of risks and benefits. *Placental abruption* can lead to both short- and long-term maternal morbidity and mortality, as well as fetal growth restriction, preterm labor, and fetal immaturity. Preventive modalities remain limited, with the use of anticoagulants employed to reduce a hypercoagulable state; however, other strategies have yet to be extensively investigated. Risk factor modification through lifestyle interventions appears to be a promising preventive approach that warrants further research.

## REFERENCES

Adane, A. A., Shepherd, C. J. C., Lim, F. J., White, S. W., Farrant, B. M., & Bailey, H. D. (2019). The impact of pre-pregnancy body mass index and gestational weight gain on placental abruption risk: A systematic review and meta-analysis. *Archives of Gynecology and Obstetrics, 300*(5), 1201–1210. https://doi.org/10.1007/s00404-019-05320-8

Amikam, U., Botkovsky, Y., Hochberg, A., Cohen, A., Levin, I., Yogev, Y., Hiersch, L., & Lavie, A. (2024). Risk factors for relaparotomy after a cesarean delivery: A case-control study. *BMC Pregnancy and Childbirth, 24*(1), 284. https://doi.org/10.1186/s12884-024-06455-6

Bączkowska, M., Kosińska-Kaczyńska, K., Zgliczyńska, M., Brawura-Biskupski-Samaha, R., Rebizant, B., & Ciebiera, M. (2022). Epidemiology, risk factors, and perinatal outcomes of placental abruption—Detailed annual data and clinical perspectives from Polish tertiary center. *International Journal of Environmental Research and Public Health, 19*(9), 5148. https://doi.org/10.3390/ijerph19095148

Baumfeld, Y., Herskovitz, R., Bar Niv, Z., Mastrolia, S. A., & Weintraub, A. Y. (2017). Placenta associated pregnancy complications in pregnancies complicated with placenta previa. *Taiwanese Journal of Obstetrics and Gynecology, 56*(3), 331–335. https://doi.org/10.1016/j.tjog.2017.04.012

Brandt, J. S., & Ananth, C. V. (2023). Placental abruption at near-term and term gestations: Pathophysiology, epidemiology, diagnosis, and management. *American Journal of Obstetrics and Gynecology, 228*(5), S1313–S1329. https://doi.org/10.1016/j.ajog.2022.06.059

Bruinsma, M. A. W., De Boer, M. A., Prins, S., & Abheiden, C. N. H. (2022). Does placental abruption cause neonatal anemia? *Acta Obstetricia et Gynecologica Scandinavica, 101*(8), 917–922. https://doi.org/10.1111/aogs.14376

Downes, K. L., Grantz, K. L., & Shenassa, E. D. (2017). Maternal, labor, delivery, and perinatal outcomes associated with placental abruption: A systematic review. *American Journal of Perinatology, 34*(10), 935–957. https://doi.org/10.1055/s-0037-1599149

Downes, K. L., Shenassa, E. D., & Grantz, K. L. (2017). Neonatal outcomes associated with placental abruption. *American Journal of Epidemiology, 186*(12), 1319–1328. https://doi.org/10.1093/aje/kwx202

Heerboth, S., Allshouse, A. A., Maves, K., & Campbell, H. (2023). Expectant management of placental abruption: Risk factors for progression and morbidity. *American Journal of Obstetrics and Gynecology, 228*(1), S225. https://doi.org/10.1016/j.ajog.2022.11.414

Hiersch, L., Shinar, S., Melamed, N., Aviram, A., Hadar, E., Yogev, Y., & Ashwal, E. (2017). Recurrent placenta-mediated complications in women with three consecutive deliveries. *Obstetrics & Gynecology, 129*(3), 416–421. https://doi.org/10.1097/AOG.0000000000001890

Jyotsna, G., Tayade, S., Sharma, S., Patel, D., & Singh, S. (2023). Placental abruption complicated by the Couvelaire uterus: A high-risk obstetric case at 30 weeks gestation. *Cureus.* https://doi.org/10.7759/cureus.46832

Khazaei, S., & Jenabi, E. (2020). The association between polyhydramnios and the risk of placenta abruption: A meta-analysis. *The Journal of Maternal-Fetal & Neonatal Medicine, 33*(17), 3035–3040. https://doi.org/10.1080/14767058.2019.1566898

Kinoshita, T., Takeshita, N., Takashima, A., Yasuda, Y., Ishida, H., & Manrai, M. (2014). A case of life-threatening obstetrical hemorrhage secondary to placental abruption at 17 weeks of gestation. *Clinics and Practice, 4*(1), 605. https://doi.org/10.4081/cp.2014.605

Kovo, M., & Schreiber, L. (2021). Placental histopathology and pregnancy outcome in placental abruption. *Thrombosis Update, 5*, 100087. https://doi.org/10.1016/j.tru.2021.100087

Li, Y., Tian, Y., Liu, N., Chen, Y., & Wu, F. (2019). Analysis of 62 placental abruption cases: Risk factors and clinical outcomes. *Taiwanese Journal of Obstetrics and Gynecology, 58*(2), 223–226. https://doi.org/10.1016/j.tjog.2019.01.010

Maraka, S., Singh Ospina, N. M., O'Keeffe, D. T., Espinosa De Ycaza, A. E., Gionfriddo, M. R., Erwin, P. J., Coddington, C. C., Stan, M. N., Murad, M. H., & Montori, V. M. (2016). Subclinical hypothyroidism in pregnancy: A systematic review and meta-analysis. *Thyroid, 26*(4), 580–590. https://doi.org/10.1089/thy.2015.0418

Mills, G., Badeghiesh, A., Suarthana, E., Baghlaf, H., & Dahan, M. H. (2020). Associations between polycystic ovary syndrome and adverse obstetric and neonatal outcomes: A population study of 9.1 million births. *Human Reproduction, 35*(8), 1914–1921. https://doi.org/10.1093/humrep/deaa144

Mishra, R., & Misra, A. P. (2019). Abruptio placenta and its maternal and fetal outcome. *International Journal of Reproduction, Contraception, Obstetrics and Gynecology, 8*(8), 3323. https://doi.org/10.18203/2320-1770.ijrcog20193559

Ni, S., Wang, X., & Cheng, X. (2021). The comparison of placental abruption coupled with and without preeclampsia and/or intrauterine growth restriction in singleton pregnancies. *The Journal of Maternal-Fetal & Neonatal Medicine, 34*(9), 1395–1400. https://doi.org/10.1080/14767058.2019.1637850

Nkwabong, E., Moussi, O. S. T., & Fouedjio, J. (2023). Risk factors for placental abruption. *Tropical Doctor, 53*(1), 37–40. https://doi.org/10.1177/00494755221116716

Odendaal, H., Wright, C., Schubert, P., Boyd, T. K., Roberts, D. J., Brink, L., Nel, D., & Groenewald, C. (2020). Associations of maternal smoking and drinking with fetal growth and placental abruption. *European Journal of Obstetrics & Gynecology and Reproductive Biology, 253*, 95–102. https://doi.org/10.1016/j.ejogrb.2020.07.018

Page, N., Roloff, K., Modi, A. P., Dong, F., & Neeki, M. M. (2020). Management of placental abruption following blunt abdominal trauma. *Cureus.* https://doi.org/10.7759/cureus.10337

Parker, J., Hofstee, P., & Brennecke, S. (2024). Prevention of pregnancy complications using a multimodal lifestyle, screening, and medical model. *Journal of Clinical Medicine, 13*(15), 4344. https://doi.org/10.3390/jcm13154344

Qiu, Y., Wu, L., Xiao, Y., & Zhang, X. (2021). Clinical analysis and classification of placental abruption. *The Journal of Maternal-Fetal & Neonatal Medicine, 34*(18), 2952–2956. https://doi.org/10.1080/14767058.2019.1675625

Roberge, S., Bujold, E., & Nicolaides, K. H. (2018). Meta-analysis on the effect of aspirin use for prevention of preeclampsia on placental abruption and antepartum hemorrhage. *American Journal of Obstetrics and Gynecology, 218*(5), 483–489. https://doi.org/10.1016/j.ajog.2017.12.238

Shinde, G. R., Vaswani, B. P., Patange, R. P., Laddad, M. M., & Bhosale, R. B. (2016). Diagnostic performance of ultrasonography for detection of abruption and its clinical correlation and maternal and foetal outcome. *Journal of Clinical and Diagnostic Research, 10*(8), QC04–QC07. https://doi.org/10.7860/JCDR/2016/19247.8288

Skeith, L., Blondon, M., & Ní Áinle, F. (2020). Understanding and preventing placenta-mediated pregnancy complications. *Hämostaseologie, 40*(03), 356–363. https://doi.org/10.1055/a-1184-8388

Skeith, L., & Rodger, M. (2017). Anticoagulants to prevent recurrent placenta-mediated pregnancy complications: Is it time to put the needles away? *Thrombosis Research, 151*, S38–S42. https://doi.org/10.1016/S0049-3848(17)30065-8

Suzuki, R., Furuya, N., Hasegawa, J., Homma, C., Iwahata, Y., & Suzuki, N. (2022). Ultrasonographic findings of placental abruption observed on superb microvascular imaging. *Taiwanese Journal of Obstetrics and Gynecology, 61*(4), 713–716. https://doi.org/10.1016/j.tjog.2021.08.007

Zhang, J. T., Lee, R., Sauer, M. V., & Ananth, C. V. (2024). Risks of placental abruption and preterm delivery in patients undergoing assisted reproduction. *JAMA Network Open, 7*(7), e2420970. https://doi.org/10.1001/jamanetworkopen.2024.20970