Indonesian Journal of Global Health Research
Volume 8 Number 6, December 2026
e-ISSN 2715-1972; p-ISSN 2714-9749
http://jurnal.globalhealthsciencegroup.com/index.php/IJGHR

RISK FACTORS OF PLACENTAL DISORDERS: A LITERATURE REVIEW

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ABSTRACT
Placental abruption, placenta praevia and placenta accreta spectrum (PAS) are placental disorders that contribute significantly to obstetric haemorrhage and maternal and perinatal morbidity. Identifying the risk factors for these disorders is crucial to support early detection and safe delivery planning. Objective to summarise the current evidence regarding the risk factors for these three placental disorders. A literature review was conducted and the study selection process was reported in accordance with the PRISMA 2020 guidelines. This review utilised 10 selected articles published between 2021 and 2025. The literature search was conducted across several comprehensive databases, including PubMed/PMC, ScienceDirect, Springer Nature Link, Wiley Online Library, and Google Scholar. The results of the narrative synthesis indicate that placental abruption is strongly associated with a history of previous abruption, the presence of placenta praevia, maternal age of 35 years or older, smoking, anaemia, and hypertensive disorders. Placenta praevia is significantly associated with advanced maternal age, a history of spontaneous abortion, a history of previous caesarean section, smoking, and the use of assisted reproductive technology (ART). There is a clear overlap in risk factors amongst these three placental disorders, although the level of certainty of the evidence varies for each factor.

Keywords: placental abruption; placenta praevia; placenta

How to cite (in APA style)
Karningsih, K., & Nurhasanah, A. (2026). Risk Factors of Placental Disorders: A Literature Review. Indonesian Journal of Global Health Research, 8(6), 1337–1344. https://doi.org/10.37287/ijghr.v8i6.2922.

INTRODUCTION

The placenta carries oxygen and nutrients from mother to fetus, so problems with where it implants, how it attaches, or when it separates can seriously harm both. Disorders of placental implantation are usually grouped into placenta previa, placenta accreta spectrum (PAS), and vasa previa. Their causes are multifactorial, and their prevalence has reportedly risen over the past two decades alongside wider use of assisted reproductive technology (ART) and cesarean delivery (Fan et al., 2024). The global incidence of PAS has increased in step with cesarean rates and is accompanied by high maternal morbidity and mortality (Morlando & Collins, 2020).

Placental abruption, the detachment of the placenta from the uterine wall before the baby is born, is among the most severe pregnancy complications. Its risk factors are still only partly understood, and some findings remain disputed (Chen et al., 2025). In one tertiary referral center in Poland, abruption occurred in 0.7% of 2,210 deliveries (Bączkowska et al., 2022). The evidence is scattered across many meta-analyses of uneven quality. An umbrella review of abruption concluded that existing meta-analytic associations cannot explain its etiology because the underlying evidence is weak (Jenabi et al., 2022b). In an umbrella review of placental anomalies, 21 of 34 meta-analyses were rated low quality on AMSTAR 2 (Fan et al., 2024). A synthesis that places the three disorders side by side and weighs the strength of evidence is therefore useful, including as support for prenatal screening of placental implantation anomalies (Jauniaux & Silver, 2020). This review summarizes the risk factors of placental abruption, placenta previa, and PAS using 10 selected articles. Vasa previa is outside its scope; its risk factors have been reviewed separately by Pavalagantharajah et al. (2020).

METHOD

This is a literature review with a narrative, thematic synthesis. The study selection process is reported according to PRISMA 2020. Articles were searched in PubMed/PMC, ScienceDirect, Springer Nature Link, and Wiley Online Library using the keywords *risk factors* AND (*placental abruption* OR *placenta previa* OR *placenta accreta spectrum*). Screening followed three stages. (1) At title and abstract screening, records were excluded if they did not address risk factors of placental disorders, did not involve human participants, or fell outside the publication period of 2021–2025. (2) At full-text assessment, articles were checked for relevance to the search keywords, suitability of the population, the type of placental disorder (placental abruption, placenta previa, or PAS), the study method (systematic review, meta-analysis, umbrella review, or observational study), and the reporting of risk factor results. (3) Articles that met all inclusion criteria and none of the exclusion criteria were included in the final review. The search identified 80 records. After 15 duplicates were removed, 65 records were screened by title and abstract, and 40 were excluded at this stage. Twenty-five full-text articles were assessed for eligibility, of which 15 were excluded because their content did not match the search keywords. Ten articles were finally included (Figure 1).

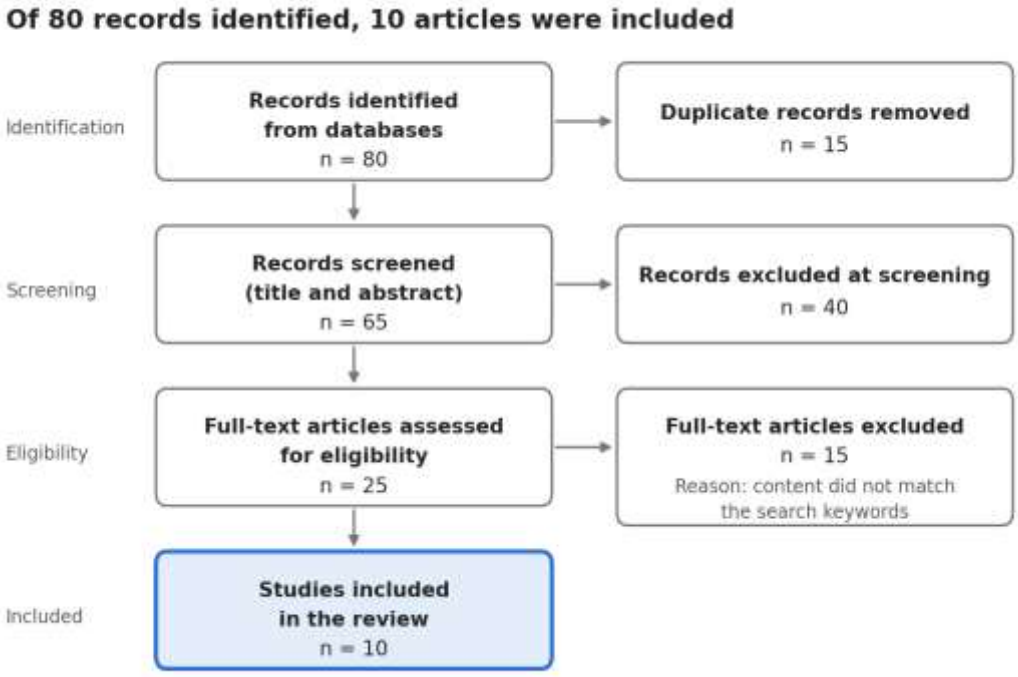


Figure 1. PRISMA 2020 flow diagram of the study selection process.

For each article we extracted the authors, year, design, sample, the placental disorder studied, and the main findings. Methodological quality was not scored with a formal appraisal tool; where available, the certainty of evidence graded by the included umbrella reviews was noted instead. Findings were synthesized narratively for each disorder. Because designs and effect measures differ (OR, AOR, aRR), estimates were not pooled statistically. Articles outside the 10 included studies served as background and discussion support.

RESULT

Characteristics of included articles

The 10 articles comprised three systematic reviews with meta-analysis, three umbrella reviews, two prospective cohorts, one multicenter registry-based cross-sectional study, and one single-center retrospective study. Three addressed placental abruption, one addressed placenta previa, and six addressed PAS (Table 1).

Table 1.
Characteristics and main findings of the 10 included articles

No	Authors (year)	Design and sample	Disorder	Main findings
1	Chen et al. (2025)	SR and meta-analysis; 54 observational studies, 7,267,241 pregnancies	Abruption	Previous abruption AOR 2.72; placenta previa AOR 7.31; age ≥35 years, smoking, anemia, gestational hypertension
2	Jenabi et al. (2022b)	Umbrella review (PubMed, Scopus, Web of Science to June 2021; AMSTAR 2)	Abruption	No factor with class I/II evidence; chronic hypertension OR 3.13; advanced age OR 1.44; smoking, cesarean, ART
3	Jenabi et al. (2022c)	Umbrella review of nine earlier reviews	Previa	Spontaneous abortion OR 1.77; advanced age OR 3.16; cesarean OR 1.60; smoking; ART
4	Kayem et al. (2024)	Prospective population-based cohort; 396 women with prior cesarean and previa/low-lying placenta	PAS	108 (27.3%) had PAS; BMI ≥30, prior uterine surgery, prior postpartum hemorrhage, number of cesareans, previa
5	Sugai et al. (2023b)	SR and meta-analysis	PAS without previa	ART and prior uterine procedures strong for PAS without previa; cesarean stronger with previa
6	Tinari et al. (2021)	SR and meta-analysis	Posterior PAS	Previa in 92.8%; prior uterine surgery 76.1%; low ultrasound accuracy
7	Imafuku et al. (2021)	Prospective cohort; 4,146 pregnancies, 87 PAS (2.1%)	PAS	Cesarean OR 3.3; curettage 2.8; hysteroscopy 5.7; UAE 44.1; ART 4.1; previa 13.1
8	Ogawa et al. (2022)	Multicenter registry, cross-sectional; 472,301 singleton births	PAS ± previa	With previa: one cesarean aRR 5.34, ≥2 aRR 16.5; without previa: ART aRR 5.05
9	Bączkowska et al. (2022)	Single-center tertiary retrospective; 2,210 deliveries	Abruption	Incidence 0.7%; uterine malformation, preterm prelabor rupture of membranes, previa spectrum, oligohydramnios
10	Jenabi et al. (2022d)	Umbrella review of pre-conception environmental factors	PAS	Reviews pre-conception factors; effect sizes should be taken from the original article

Note: SR = systematic review; UAE = uterine artery embolization; OR = odds ratio; AOR/aRR = adjusted estimates.

Risk factors of placental abruption

Chen et al. (2025) pooled 54 observational studies covering 7,267,241 pregnancies and identified 58 independent risk factors spanning maternal baseline characteristics and pregnancy complications. A previous abruption was the strongest baseline factor (AOR 2.72; 95% CI 2.16–3.42), and placenta previa was strongly associated with abruption (AOR 7.31; 95% CI 4.78–11.19). Other baseline factors included age ≥35 years, low pre-pregnancy BMI (<18.5 kg/m²), smoking, alcohol and marijuana use, multiple pregnancy, parity ≥3, anemia, fewer than four antenatal visits, prior cesarean delivery, prior miscarriage, prior stillbirth, and ART.

Jenabi et al. (2022b) found no factor supported by high-level (class I or II) evidence. Maternal asthma, prior cesarean, cocaine use, endometriosis, chronic hypertension (OR 3.13; 95% CI 2.04–4.80), advanced maternal age (OR 1.44; 95% CI 1.35–1.54), smoking, and ART were associated with abruption. Four further factors—low pre-pregnancy BMI (OR 1.38), preeclampsia (OR 1.73), uterine leiomyoma (OR 2.63), and marijuana use (OR 1.78)—rested on weak (class IV) evidence. At a single tertiary center, the factors identified were uterine malformation, preterm prelabor rupture of membranes, the placenta previa spectrum, and oligohydramnios (Bączkowska et al., 2022).

Risk factors of placenta previa

Jenabi et al. (2022c) summarized nine earlier reviews and linked placenta previa to prior spontaneous abortion (OR 1.77; 95% CI 1.60–1.94), advanced maternal age (OR 3.16; 95% CI 2.79–3.57), prior cesarean delivery (OR 1.60; 95% CI 1.44–1.76), smoking, and ART. Fan et

al. (2024) added a grading of evidence credibility: prior spontaneous abortion, threatened miscarriage, uterine leiomyoma, and cocaine use carried high-level evidence, whereas age above 35, age above 45 (OR 3.61; 95% CI 2.70–4.81; Sugai et al., 2023a), and ART in singleton pregnancies carried moderate evidence. The estimate for prior cesarean differed between meta-analyses (OR 1.60 in Jenabi et al., 2022c versus OR 1.79 in the table of Fan et al., 2024) because they drew on different studies. Maternal obesity was reported to be inversely related to previa (OR 0.83; 95% CI 0.71–0.96; Fan et al., 2024).

Risk factors of placenta accreta spectrum

Placenta previa and prior cesarean delivery. In a prospective cohort of 4,146 pregnancies, 87 (2.1%) had PAS, and both current placenta previa (OR 13.1; 95% CI 7.9–21.8) and prior cesarean (OR 3.3; 95% CI 1.9–5.7) were independently associated with it (Imafuku et al., 2021). A registry of 472,301 singleton births contained 426 PAS cases with previa and 1,827 without; among those with previa, one prior cesarean corresponded to an aRR of 5.34 and two or more to an aRR of 16.5 (Ogawa et al., 2022). Kayem et al. (2024) found PAS in 108 of 396 women (27.3%) who had a prior cesarean and a previa or low-lying placenta; the rate ranged from 5% (one cesarean with a posterior low-lying placenta) to 63% (three or more cesareans with previa). Independent factors were BMI ≥30, prior uterine surgery, prior postpartum hemorrhage, number of prior cesareans, and previa. Pooled estimates of OR 4.75 for previa and OR 3.12 for prior cesarean, both with moderate credibility, were reported by Fan et al. (2024). Among women whose previa overlay a cesarean scar, those with PAS more often had two or more cesareans, a shorter interval since the last one, and an anterior placenta (Ma et al., 2026).

Intrauterine procedures, ART, and smoking. Imafuku et al. (2021) associated PAS with curettage (OR 2.8; 95% CI 1.7–4.6), hysteroscopic surgery (OR 5.7; 95% CI 2.3–14.4), uterine artery embolization (OR 44.1; 95% CI 13.8–141.0; a very wide interval, probably reflecting few cases), and ART (OR 4.1; 95% CI 2.4–7.1). In vitro fertilization has been described as an independent risk factor for PAS (Salmanian et al., 2020), and ART was the strongest predictor in PAS without previa (aRR 5.05; 95% CI 4.50–5.66), where prior cesarean was not significant (Ogawa et al., 2022). The pooled ART estimate was OR 5.03 (95% CI 3.34–7.56) but of weak credibility, while smoking (OR 1.21; 95% CI 1.02–1.41) had high-level evidence (Jenabi et al., 2022a, as summarized in Fan et al., 2024).

PAS without previa and posterior PAS. Sugai et al. (2023b) reported that ART and earlier uterine procedures were strong risk factors for PAS without previa, while prior cesarean stood out for PAS with previa. PAS without previa tended to be milder (OR for invasive placenta 0.24; 95% CI 0.16–0.37) but was hard to detect prenatally. Across 3,342 PAS pregnancies (2,365 without and 977 with previa), PAS without previa was less likely to be diagnosed antenatally (OR 0.07; 95% CI 0.04–0.11; Hessami et al., 2022). In posterior PAS, previa was present in 92.8% of cases and 76.1% had prior uterine surgery, mostly cesarean or curettage; prenatal ultrasound detected only 56.4%, with very low diagnostic accuracy (Tinari et al., 2021).

Hypertension and pre-conception factors. Unlike abruption, hypertensive disorders of pregnancy were not significantly associated with PAS (OR 0.74; 95% CI 0.38–1.44) (Li et al., 2023, as summarized in Fan et al., 2024). Jenabi et al. (2022d) examined pre-conception environmental factors for PAS; the size of each association should be taken from that article.

Cross-disorder summary

Table 2.
Summary of risk factors by placental disorder

Factor	Abruption	Previa	PAS
Advanced maternal age	Yes	Yes	Yes (weak evidence)
Smoking	Yes	Yes	Yes
Prior cesarean	Yes	Yes	Yes

Prior abortion/miscarriage	Yes	Yes	Not significant
ART	Yes	Yes	Yes
Hypertension/preeclampsia	Yes	–	Not significant
Placenta previa	Yes	–	Yes
Intrauterine procedures and UAE	–	UAE (weak evidence)	Yes
BMI	Low	Obesity: inverse association	≥30 (previa with cesarean)

Note: "–" means not reported in the sources reviewed.

In the fields of midwifery and reproductive biology, the placenta is a vital organ that facilitates the exchange of oxygen and nutrients between the mother and the foetus. The prevalence of these conditions has reportedly been rising steadily over the past two decades, in line with the global trend of increasing caesarean section rates and the use of assisted reproductive technology (ART). From a midwifery perspective, a thorough understanding of the risk factors for placental disorders is the foundation of high-quality antenatal care (ANC). Midwives are at the forefront of conducting a comprehensive medical history during the first antenatal visit. Identifying modifiable risk factors such as smoking, insufficient antenatal visits (fewer than four), or an unfavourable body mass index (BMI) is crucial, as these factors can be addressed through midwifery counselling. Maternal age over 35 years, smoking, a history of caesarean section, and repeated exposure to ART emerge as risk factors for more than one type of placental disorder. This requires midwives to carry out careful risk stratification. From a reproductive science perspective, the overlap of these risk factors makes perfect sense from a pathophysiological standpoint. Damage to the endometrial and myometrial layers resulting from previous surgical procedures or medical interventions (such as curettage, hysteroscopy and caesarean section) can influence how and where the placenta implants.

DISCUSSION

Overlapping risk factors

Advanced maternal age, smoking, prior cesarean, and ART each appeared in more than one disorder. This fits the idea that damage to or changes in the endometrium and myometrium from earlier procedures influence where and how the placenta implants. Where a previa lies over a cesarean scar, abnormal implantation has been linked to defective decidualization and myometrial fibrosis at the scar (Ma et al., 2026). This explanation is a hypothesis, and because most studies are observational, causality cannot be established. Hypertension, in contrast, stood out for abruption but not for PAS, suggesting different pathways. Earlier work held that preeclampsia was not a risk factor for abruption, whereas newer studies treat it as an independent factor (Chen et al., 2025); in the umbrella review, the evidence for preeclampsia was only weak (Jenabi et al., 2022b).

Placenta previa as a link

Placenta previa is strongly tied to abruption (AOR 7.31) and to PAS (OR 13.1 in Imafuku et al., 2021; OR 4.75 in Fan et al., 2024). Among women with a prior cesarean and a previa or low-lying placenta, PAS risk varies widely with the number of cesareans and placental location (Kayem et al., 2024), so combining obstetric history with imaging of placental position helps stratify risk. Previa also carries other obstetric consequences, such as an association with breech presentation (OR 1.93; 95% CI 1.09–2.76; Jenabi & Afshari, 2023).

PAS without previa: an easily missed risk

Sugai et al. (2023b), Hessami et al. (2022), and Ogawa et al. (2022) together show that PAS without previa is driven mainly by ART and uterine procedures, is diagnosed less often before birth, and differs from PAS with previa. Ultrasound is also less accurate when the placenta is posterior (Tinari et al., 2021). Clinicians should therefore stay alert to PAS in women with ART pregnancies or prior intrauterine procedures even when the placenta is not previa.

Strength of evidence and differing estimates

No risk factor for abruption reached class I or II evidence (Jenabi et al., 2022b), and most meta-analyses of placental anomalies were of low quality (Fan et al., 2024). Estimates vary between meta-analyses, and some intervals are very wide (for example, UAE). The direction of the BMI association is also inconsistent: low BMI relates to abruption, obesity is inversely related to previa, and BMI ≥30 relates to PAS in women with previa and prior cesarean. Findings should be read in light of each study's population and design.

Implications for practice

The findings support screening for risk factors from the start of antenatal care. Modifiable factors such as smoking can be addressed through counseling, and attending fewer than four antenatal visits was itself a risk factor for abruption (Chen et al., 2025). Women with prior cesarean delivery, intrauterine procedures, or ART should be counseled about previa and PAS risk and have placental location assessed. For high-risk women, particularly those with previa and repeat cesareans, early referral to a facility able to manage massive obstetric hemorrhage may be considered (Kayem et al., 2024; Ogawa et al., 2022). These implications are the author's interpretation and should be aligned with local clinical guidelines.

Limitations

Most evidence is observational and open to confounding and bias. Definitions, populations, and effect measures differ across studies, so estimates were not pooled. The three umbrella reviews may overlap in the primary studies they summarize. Only 10 articles were included, no formal quality appraisal was applied, and most studies come from outside Indonesia, so generalizing to Indonesian populations calls for caution. Some figures here come from the summary of Fan et al. (2024) and should be checked against the original articles.

CONCLUSION

The risk factors of placental abruption, placenta previa, and PAS overlap: advanced maternal age, smoking, prior cesarean, ART, and placenta previa recur, while hypertension is prominent in abruption and intrauterine procedures are prominent in PAS. Placenta previa strongly links abruption and PAS, and PAS without previa is closely tied to ART and uterine procedures. Because the certainty of evidence differs between factors, results should be interpreted cautiously.

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