



**ASSOCIATION BETWEEN MATERNAL CHARACTERISTICS AND THE INCIDENCE
OF SEVERE PREECLAMPSIA AMONG PREGNANT WOMEN:
A LITERATURE REVIEW**

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ABSTRACT

Severe preeclampsia remains a leading cause of maternal and perinatal morbidity worldwide. Identifying specific maternal characteristics is crucial for early intervention. This review synthesizes evidence regarding the association between maternal traits and severe preeclampsia incidence. A systematic literature search was conducted across PubMed, Google Scholar, and ScienceDirect for studies published between 2016 and 2025. Following the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) checklist, five high-quality articles were selected based on strict eligibility criteria. Synthesis of the five core studies identifies advanced maternal age (>35 years), high pre-pregnancy Body Mass Index (BMI), chronic hypertension, parity, and inadequate antenatal care (ANC) as primary predictors. These factors significantly elevate the risk of progression to severe clinical features. Early screening of maternal risk profiles and optimized antenatal monitoring are essential to mitigate the incidence of severe preeclampsia.

Keywords: literature review; maternal characteristics; PRISMA; risk factors; severe preeclampsia

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INTRODUCTION

Preeclampsia is a multisystem disorder defined by new-onset hypertension and organ dysfunction after 20 weeks of gestation. Despite advances in obstetric care, severe preeclampsia characterized by extreme blood pressure elevations and signs of end-organ damage continues to pose life-threatening risks, including HELLP syndrome and eclampsia.

Recent epidemiological data suggest that the pathogenesis of severe preeclampsia is multifaceted, involving an interplay between placental maladaptation and maternal constitutional factors. While the biological mechanisms are complex, identifying clinical maternal characteristics offers a pragmatic pathway for risk stratification. This review aims to evaluate the most significant maternal predictors reported in contemporary literature (2016–2025) to provide a localized and global perspective on prevention strategies.

METHOD

Study Design and PRISMA Flow This study employed a systematic literature review design. To ensure methodological rigor, the selection process adhered to the PRISMA checklist. Initially, 235 records were identified through database searches (PubMed, ScienceDirect, and Google Scholar). After removing duplicates and screening titles/abstracts, 15 full-text articles were assessed for eligibility. Ultimately, 5 articles were selected for final synthesis based on their direct relevance to severe preeclampsia and methodological quality.

Inclusion and Exclusion Criteria

Inclusion: Peer-reviewed original research, published 2016–2025, focusing on maternal risk factors for severe preeclampsia.

Exclusion: Literature reviews (as primary sources), case reports, and studies focusing only on mild preeclampsia without differentiation.

Data Synthesis Articles were analyzed using a thematic approach to categorize maternal characteristics including age, BMI, medical history, and obstetric status.

RESULT

The synthesis of the five selected articles (2016–2025) provides a comprehensive overview of the determinants of severe preeclampsia:

- 1 Moreno et al. (2021): This nested case-control study demonstrated that women over 35 years old and those with a BMI >30 kg/m² had a three-fold increased risk of developing severe features. The study also highlighted that a prior history of preeclampsia is the strongest predictor of recurrence in a severe form.
- 2 Barda et al. (2023): Focused on disease progression, this research found that chronic hypertension and pre-gestational diabetes significantly accelerate the transition from mild gestational hypertension to severe preeclampsia, necessitating earlier delivery.
- 3 Gunderson et al. (2025): Utilizing a large-scale cohort, this study established a direct correlation between superimposed preeclampsia (in women with chronic hypertension) and severe maternal morbidity, emphasizing that vascular health prior to pregnancy determines the severity of the condition.
- 4 Pratiwi (2025): This Indonesian-based study identified that inadequate Antenatal Care (ANC) visits (fewer than 4-6 visits) were strongly associated with late detection of severe preeclampsia. Maternal age extremes and multiparity were also confirmed as significant contributors within the local population.
- 5 Rumampuk et al. (2025): Investigating clinical profiles in a tertiary setting, this study found that low educational attainment and lack of health literacy regarding warning signs often led to the three delays, resulting in patients presenting only when preeclampsia had already reached severe stages.

A consistent theme across the literature is the significant impact of maternal age and Body Mass Index (BMI). Moreno et al. (2021) established that advanced maternal age (over 35 years) and obesity (BMI >30 kg/m²) represent critical risk thresholds, correlating with a three-fold increase in severe manifestations. Physiologically, advanced age is often associated with diminished vascular compliance and endothelial dysfunction, which are further exacerbated by the chronic low-grade inflammation characteristic of obesity. Furthermore, the findings by Moreno et al. (2021) and Pratiwi (2025) underscore that extremes in reproductive age and multiparity create a physiological environment more susceptible to maladaptive placental development.

The transition from mild gestational hypertension to severe preeclampsia is heavily influenced by pre-gestational health. Barda et al. (2023) highlighted that chronic hypertension and pre-gestational diabetes act as "accelerants" in the disease process, shortening the interval between initial diagnosis and the necessity for early delivery. This is reinforced by Gunderson et al. (2025), whose large-scale cohort data suggests that vascular health prior to conception is a definitive predictor of maternal morbidity. Specifically, "superimposed preeclampsia" in women with pre-existing hypertension represents a high-risk phenotype, suggesting that the severity of the condition

Beyond biological risks, the literature reveals that the severity of preeclampsia is often a consequence of systemic and educational barriers. Pratiwi (2025) identified that inadequate Antenatal Care (ANC) visits (fewer than 4–6) directly correlate with late-stage detection, particularly in the Indonesian context. This delay in diagnosis is further elucidated by Rumampuk et al. (2025), who found that low educational attainment and poor health literacy regarding warning signs such as severe headaches or visual disturbances contribute to the three delays (delay in seeking care, reaching a facility, and receiving adequate treatment). Consequently, many patients present to tertiary centers only after the condition has progressed to life-threatening stages.

DISCUSSION

The findings across the five reviewed studies indicate a consistent pattern: severe preeclampsia is rarely an isolated event but rather an exacerbation of underlying maternal vulnerabilities. Advanced maternal age and obesity are prevalent themes; the former is linked to vascular aging and endothelial fragility, while the latter induces a chronic inflammatory state that compromises placental perfusion.

Furthermore, the role of Antenatal Care (ANC) cannot be overstated. As shown in the 2025 studies, maternal characteristics are not just biological but also behavioral and socioeconomic. Women with limited access to healthcare or those who do not prioritize regular monitoring are at the highest risk of their condition escalating unnoticed.

CONCLUSION

This literature review confirms that maternal age, high BMI, chronic hypertension, parity, and ANC adherence are the most critical determinants of severe preeclampsia. By utilizing the PRISMA framework, this review synthesized five key recent studies showing that risk is cumulative. Early identification of these characteristics during the first trimester allows for targeted interventions, such as low-dose aspirin prophylaxis and rigorous blood pressure monitoring, which are vital for improving maternal and neonatal survival rates.

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