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Review Article

Pre-Eclampsia and Eclampsia: A Review

Naveena S*, Ancy B, Jayapriya N, Arulprakasam K C

JKKMMRF'S Annai JKK Sampoorani Ammal College of Pharmacy, Komarapalayam, Tamil Nadu, India

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ABSTRACT

Pre-eclampsia (PE) is a complex hypertensive disorder of pregnancy characterized by new-onset hypertension after 20 weeks' gestation accompanied by proteinuria or end-organ dysfunction. It affects 2–8% of pregnancies globally and remains a leading cause of maternal and perinatal morbidity and mortality, with more than 70,000 maternal and 500,000 fetal deaths annually worldwide. Eclampsia refers to the occurrence of generalized seizures in preeclampsia, significantly elevating risk. The only definitive treatment is delivery of the placenta and fetus. This review covers the epidemiology, classification, etiology, clinical features, maternal and fetal complications, prediction, management, prevention, long-term outcomes, and future directions of research on pre-eclampsia and eclampsia, emphasizing the need for early detection and comprehensive management to improve maternal and neonatal outcomes

INTRODUCTION

Preeclampsia (PE) is a complex hypertensive disorder of pregnancy characterized by new-onset hypertension after 20 weeks' gestation accompanied by proteinuria or end-organ dysfunction[3]. It affects 2–8% of pregnancies globally and remains a leading cause of maternal and perinatal morbidity and mortality[4], with more than 70,000 maternal and 500,000 foetal deaths annually worldwide due to this condition[6]. Eclampsia refers to the occurrence of generalized seizures in preeclampsia, significantly elevating risk[8]. The only definitive treatment is delivery of the placenta and foetus[9].

HISTORICAL BACKGROUND

Early descriptions of eclampsia date back to Hippocrates[10].The clinical understanding evolved into the modern clinical syndrome in the 19th and 20th centuries[11]. Recognition of placental origin and endothelial dysfunction transformed preeclampsia research and management paradigms[4].

***Corresponding Author:** Naveena S
Address: *JKKMMRF'S Annai JKK Sampoorani Ammal College of Pharmacy, Komarapalayam, Tamil Nadu, India*
Email ✉: naveenasenthil04@gmail.com

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EPIDEMIOLOGY AND DISEASE BURDEN

Hypertensive disorders of pregnancy complicate roughly 5–10% of pregnancies, with preeclampsia incidence varying by region[3]. The burden is especially high in low- and middle-income countries, with increased maternal mortality from delayed diagnosis and limited care access[13].

CLASSIFICATION AND SUBTYPES

Preeclampsia is classified as early-onset (<34 weeks gestation) or late-onset (≥34 weeks), with distinct aetiologies [15]—placental insufficiency in early-onset and maternal constitutional factors in late-onset[16]. Additional classifications include superimposed preeclampsia on chronic hypertension[17] and postpartum preeclampsia[18].

ETIOLOGY AND PATHOPHYSIOLOGY

The disorder originates from defective trophoblast invasion leading to abnormal remodelling of spiral arteries[4], resulting in placental hypoperfusion and ischemia[9]. This causes increased release of antiangiogenic factors such as soluble fms-like tyrosine kinase-1 (sFlt-1) and soluble endoglin (sEng), which disrupt vascular endothelial growth factor (VEGF) and transforming growth factor-beta (TGF-β) signalling, producing systemic endothelial dysfunction[4][19]. Immune maladaptation, oxidative stress, and genetic susceptibility contribute further[20].

RISK FACTORS

Primiparity, advanced maternal age, multifetal gestations, preexisting hypertension, diabetes, obesity, renal disease, assisted reproduction, and family history are well-established risk factors [12][15][23][14][24].

CLINICAL FEATURES AND DIAGNOSIS

PE typically presents with hypertension (BP ≥140/90 mmHg) and proteinuria (>0.3 g/24h)[8], but diagnosis can include other end-organ signs without proteinuria (e.g., thrombocytopenia, renal insufficiency, liver dysfunction, neurological symptoms)[25]. Eclampsia is new-onset generalized seizures not attributed to other causes[10].

MATERNAL COMPLICATIONS

Complications include eclampsia seizures, HELLP syndrome (haemolysis, elevated liver enzymes, low platelets), renal failure, pulmonary oedema, stroke, and maternal death[21][22][14][8].

FETAL AND NEONATAL OUTCOMES

Foetal growth restriction, preterm birth, placental abruption, stillbirth, and neonatal mortality are common adverse outcomes[11][7][24][28].

PREDICTION AND SCREENING

First-trimester screening combining maternal factors, uterine artery Doppler, and serum biomarkers (e.g., sFlt-1/PlGF ratio) improves early prediction, especially for preterm PE[6]. However, prediction for term and postpartum Pre-Eclampsia remains limited[5].

MANAGEMENT

Mild Pre-Eclampsia is managed expectantly with monitoring until 37 weeks delivery[2]. Severe Pre-Eclampsia and eclampsia require hospitalization, antihypertensives (labetalol, nifedipine, hydralazine)[9], and magnesium sulphate for seizure prophylaxis/treatment[25]. Prompt delivery is indicated with maternal/foetal compromise[8].

PREVENTION

Low-dose aspirin (75-150 mg from 12–16 weeks) reduces risk in high-risk pregnancies[12], along with calcium supplementation where dietary intake is low[6]. Lifestyle modifications and control of comorbidities also help[23].

POSTPARTUM AND LONG-TERM OUTCOMES

Women with PE have increased lifetime risks of hypertension, ischemic heart disease, stroke, diabetes, and renal disease, necessitating long-term cardiovascular risk monitoring[27]. Offspring may have increased risks of hypertension and neurodevelopmental disorders[26].

GLOBAL DISPARITIES AND GUIDELINES

Maternal mortality is vastly higher in low-resource settings due to lack of antenatal care, diagnostic facilities, and treatment availability[7]. International guidelines (ISSHP, FIGO, WHO, ACOG) promote standardized evidence-based care, emphasizing early detection and preventive therapies[13].

PSYCHOLOGICAL IMPACT AND QUALITY OF LIFE

Pregnancies complicated by Pre-Eclampsia/ eclampsia increase maternal anxiety, stress, and impaired quality of life, requiring psychosocial support[29].

FUTURE DIRECTIONS

Emerging research focuses on molecular targets, better diagnostic biomarkers, precision medicine, and global implementation of care to reduce disease burden[26]. Large, multi-centre trials and novel therapeutics are priorities[22][14].

CONCLUSION

Pre-eclampsia and eclampsia are serious pregnancy conditions causing high blood pressure and organ stress. They can harm both mother and baby if not treated. Careful monitoring and timely delivery help protect health. While treatment advances continue, understanding and early detection remain key to safer pregnancies and healthier babies.

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