INDOGENIUS

ISSN 2828-1365

Volume 4, Issue 2 : 572 - 580

Management of Current Pre Eclampsia

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Article Info

Keywords :
Stimulation, Gross Motor Skills, Carpet Gross Motor Skills

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ABSTRACT

Introduction & Objective: Preeclampsia and eclampsia remain significant health issues contributing to high maternal and perinatal mortality rates, particularly in developing countries. Preeclampsia, characterized by hypertension, edema, and proteinuria during pregnancy, affects 2% to 8% of pregnancies globally and is a major cause of maternal and fetal death. This study aims to review the current management strategies for preeclampsia to prevent its progression into eclampsia and improve maternal and neonatal outcomes. **Method:** A literature review was conducted using secondary data sources. Articles were obtained through systematic searches in databases such as PubMed and Google Scholar, using keywords like "Management" and "Preeclampsia" from publications between 2020 and 2024 in English and Indonesian. **Results:** Management of preeclampsia involves several key components: blood pressure control using antihypertensives such as nifedipine and methyldopa; seizure prevention through magnesium sulfate administration; decision-making regarding timing and mode of delivery; careful fluid management to avoid pulmonary edema; nutritional management focusing on sodium restriction and balanced diet; physical activity to lower gestational hypertension risk; and long-term follow-up due to increased cardiovascular risk post-preeclampsia. The literature indicates that a combination of interventions is more effective than single therapy approaches. **Conclusion:** Comprehensive management of preeclampsia is essential to prevent disease progression and ensure favorable outcomes for both mother and child. Integrated short- and long-term strategies are necessary to improve maternal safety and long-term health quality.

DOI: https://doi.org/10.56359/igj.v4i2.736

Introduction

Preeclampsia and eclampsia are serious health concerns that require special attention, as preeclampsia is a leading cause of maternal and perinatal mortality, particularly in developing countries. To this day, preeclampsia and eclampsia are still referred to as "the diseases of theories" due to their persistently high incidence rates and significant contributions to maternal morbidity and mortality. Preeclampsia is a condition characterized by hypertension, edema, and proteinuria that arises during pregnancy (Hidayah et al., 2022).

Preeclampsia affects 2% to 8% of all pregnancies and causes more than 70,000 maternal deaths and 500,000 fetal deaths globally each year (Karrar et al., 2025). It is the second leading cause of maternal morbidity and mortality after hemorrhage, especially in developing nations, making effective management essential to achieving maternal mortality reduction goals (Veri et al., 2024).

The primary goal of preeclampsia management is to prevent the progression of the condition into the more dangerous eclampsia and to ensure optimal delivery outcomes for both the mother and the baby. This includes close monitoring, stabilization of the mother's condition, and planning the safest time and method of delivery. Obstetric interventions should consider fetal maturity, maternal condition, and risk of complications to minimize trauma during childbirth. Therefore, all cases of severe preeclampsia must be actively managed, both through pharmacological therapy—such as antihypertensive medications and magnesium sulfate to prevent seizures—and obstetric interventions based on medical indications.

One key aspect of preeclampsia management is antihypertensive therapy. This aims to control the patient's blood pressure to a level that does not compromise organ function or physiological stability, thereby reducing overall morbidity and mortality. Antihypertensive treatment in pregnancy is considered successful and effective when the blood pressure target of <140/90 mmHg is achieved (Sulastri, 2021). However, preeclampsia management involves not only blood pressure reduction but also various other clinical components. Blood pressure control is essential to prevent vascular complications such as stroke and heart failure. Seizure prevention using magnesium sulfate remains the gold standard in preventing the progression to eclampsia (Garovic et al., 2022). In addition, decisions regarding the timing and method of delivery are crucial, as delivery is the only definitive treatment to halt disease progression.

Fluid management must be carefully administered to avoid fluid overload and life-threatening pulmonary edema. Management also includes diet regulation, particularly calcium supplementation for high-risk women, as well as light physical activity recommendations to prevent long-term complications. After childbirth, long-term follow-up is critical, as women with a history of preeclampsia are at greater risk of developing cardiovascular and chronic kidney disease later in life (Khedagi & Bello, 2017).

A comprehensive approach to the management of preeclampsia—both in the short and long term—is essential to improving the safety and quality of life for both mothers and their children in the future.

Objective

This study aims to review the current management strategies for preeclampsia to prevent its progression into eclampsia and improve maternal and neonatal outcomes.

Method

The method used in this study is a literature review, which aims to explore and gather updated information regarding the current management of preeclampsia. The type of data used is secondary data, obtained through a review of scientific articles, research journals, and relevant academic publications. This method was chosen as it is considered effective in summarizing, comparing, and evaluating existing research findings to provide a comprehensive understanding of clinical strategies in preeclampsia management.

The data sources were obtained through a systematic search of leading electronic databases, such as PubMed and Google Scholar, using the keywords: "Management" and "Preeclampsia," with the publication range set between 2020 and 2024, in both English and Indonesian. The inclusion criteria involved full-text access, relevance to preeclampsia management, and peer-reviewed articles. The selected studies were thoroughly reviewed to identify key findings that serve as the basis for drawing updated conclusions and recommendations on preeclampsia management.

Results

There is a difference in the management of hypertension during pregnancy and outside of pregnancy. Most cases of hypertension outside of pregnancy are chronic essential hypertension. Antihypertensive therapy in non-pregnant individuals aims to prevent long-term complications such as stroke and myocardial infarction. In contrast, hypertension during pregnancy usually returns to normal in the postpartum period, so the therapy is not intended for long-term complication prevention. Preeclampsia carries the risk of progressing to eclampsia; therefore, a rapid reduction in blood pressure is required in cases of severe preeclampsia (Myrtha, 2015).

TABLE 1. Summary of current management of preeclampsia (Chang et al., 2023)

Management	Explanation
Blood pressure control	Choices for antihypertensive therapy during pregnancy are limited. The most frequently administered drugs include labetalol, hydralazine, and nifedipine. The former two come in intravenous and oral forms, of which intravenous injections are often used in severe or emergent conditions. Labetalol and nifedipine are more commonly recognized as the first antihypertensive medications for gestational hypertensive disorders.
Seizure prevention	Magnesium is the drug of choice for seizure prevention in preeclamptic and eclamptic cases. It is proven to be superior to other anticonvulsants and is associated with fewer side effects. The mechanism is primarily related to its calcium antagonistic effect and potential to function as an NMDA blocker. It is given with an initial loading dose followed by

Management	Explanation
	continuous infusion. Neurologic signs and respiratory patterns should be closely monitored to prevent toxicity.
Delivery and Termination of Pregnancy	The only way to stop or reverse the process of preeclampsia formation is delivery. Therefore, prompt delivery is indicated once the patient reaches term pregnancy. For preterm women with severe disease features, termination of delivery should be strongly considered, but risks higher neonatal morbidities and mortalities due to immaturity. In these cases, cortiocosteroids should be administered for fetal lung maturation before delivery if time allows
Fluid management	Preeclamptic women often experience fluid overload, which could lead to serious complications such as pulmonary edema. Therefore, unnecessary fluids should be avoided.
Diet management	Most evidence regarding diet management against preeclampsia is not strongly convincing. However, maternal weight control, high fiber intake, probiotics use, calcium and vitamin D supplements, multivitamin and multimineral supplements, and avoidance of a high-salt diet and raw food are considered to be beneficial. A Mediterranean-style diet that is rich in vegetables, fruits, and healthy fats has also been proven to lower the risks of preeclampsia.
Exercise	Aerobic exercise is associated with a reduction of gestational hypertensive disorders as it promotes placentation and a healthier immune reaction in general. The frequency, intensity, type, and time of exercise should be an individualized plan discussed between the patient and physician based on the maternal condition.
Long-term follow-up	Even after delivery and the recovery of preeclampsia, women still bear an increased risk of developing cardiovascular, renal, and hepatic sequelae, along with other chronic diseases. Therefore, long-term follow-up for the patient's health condition is indicated.

Discussion

Blood Pressure Control

Lowering blood pressure is a key parameter in the treatment of preeclampsia. Patients with severe preeclampsia typically present with blood pressure levels ≥160/110 mmHg upon hospital admission. According to the Queensland Clinical Guidelines (QCG), the target blood pressure at discharge is 130–150/80–90 mmHg. Meanwhile, the Indonesian National Clinical Practice Guidelines (PNPK) recommend a target of <160/<110 mmHg for preeclampsia patients (Rachmaini et al., 2023).

Preeclampsia occurring at <34 weeks of gestation requires careful administration of antihypertensive drugs. These patients are often intravascularly volume-depleted, making them more vulnerable to rapid blood pressure drops. Hypotension and reduced uteroplacental flow must be closely monitored, as placental ischemia is a central mechanism in the pathophysiology of preeclampsia. The primary goal of antihypertensive therapy is to reduce maternal risk (Myrtha, 2015).

Antihypertensives are used as part of the management of severe preeclampsia. The aim is to prevent life-threatening cerebrovascular events for both mother and fetus, especially given the high incidence of preeclampsia (Rachmaini et al., 2023).

Nifedipine and methyldopa are the most commonly used treatments for severe preeclampsia, either as monotherapy or in combination. Methyldopa reduces norepinephrine surges on smooth muscle receptors, leading to vasodilation. It is

considered the safest antihypertensive for pregnant women due to its minimal side effects on both mother and fetus. Nifedipine works by preventing the opening of calcium channels, thereby reducing calcium entry into cardiac and vascular muscle cells, which induces vasodilation. Furosemide, a loop diuretic, is administered in preeclamptic patients with edema. It increases urinary excretion of sodium, chloride, and water, decreasing plasma and cellular fluid volume, which in turn reduces cardiac output and lowers blood pressure (Rachmaini et al., 2023).

Blood pressure reduction is more effective with combination therapy than with monotherapy. Studies show that antihypertensive use significantly affects blood pressure values; the more combinations used, the greater the difference in blood pressure from admission to discharge (Rachmaini et al., 2023).

Seizure Prevention

Magnesium sulfate ($MgSO_4$) plays a vital role in preeclampsia management. Its mechanism includes vasodilation through smooth muscle relaxation, including in peripheral and uterine vessels, and it also acts as an anticonvulsant (Apriyana, 2021). $MgSO_4$ is recommended for seizure prophylaxis in women with severe preeclampsia (Myrtha, 2015).
Multiple studies have shown that $MgSO_4$ significantly reduces eclamptic seizures, the need for antihypertensives, and systolic blood pressure. It also serves as a neuroprotective agent for the fetus (Amalia, 2020).

The recommended routes of $MgSO_4$ administration for the prevention and treatment of eclampsia are intravenous or intramuscular. However, intramuscular administration is now reduced in Indonesia due to pain concerns. $MgSO_4$ is initially given as 4 grams of 40% solution in 10 cc over 5–10 minutes at the onset of seizures. Maintenance therapy includes a 6-gram infusion in Ringer's Lactate monitored over 4–6 hours and continued for up to 24 hours postpartum or after the last seizure.

To anticipate toxicity, 10% calcium gluconate (1 gram in 10 cc) should be prepared and administered intravenously over 3 minutes if needed. Signs of toxicity should be monitored, including respiratory rate (≥16 breaths per minute), presence of patellar reflexes, and urine output (≥30 ml/hour over the past 4 hours). $MgSO_4$ administration should be stopped if signs of toxicity are observed (Prawirohardjo, 2016).

Delivery and Termination of Pregnancy

Preeclampsia and eclampsia can lead to other pregnancy complications, such as preterm labor, either spontaneous or iatrogenic. Severe preeclampsia is one of the most common indications for iatrogenic preterm delivery (Widjaja et al., 2024).

Termination of pregnancy is medically indicated when maternal or fetal conditions deteriorate and cannot be managed conservatively. Indications include worsening maternal status (e.g., pulmonary edema, impending eclampsia, or HELLP

syndrome), fetal compromise (e.g., distress or growth restriction), and gestational age ≥34 weeks with stable maternal-fetal conditions (Wijayanti & Ernawati, 2019).

Fluid Management

Intravenous fluid administration may be necessary in women with preeclampsia, but it also carries the risk of iatrogenic pulmonary edema (Anthony & Schoeman, 2013). In cases of severe preeclampsia, fluid intake should be limited to 80 ml/hour unless ongoing fluid losses (e.g., hemorrhage) are present (Mirani et al., 2023).

Diet Management

Nutritional status and intake of key nutrients can help reduce the risk of preeclampsia. Excessive gestational weight gain is associated with preeclampsia risk, although fluid retention may contribute to this relationship. Diets rich in fruits, vegetables, and dietary fiber are linked to reduced preeclampsia risk, while adherence to a Western diet may increase it. Nutrients thought to raise blood pressure, such as sodium, have little to no effect on preeclampsia risk (Bernolian et al., 2023; Esquivel, 2023).

Sodium intake influences blood pressure by increasing plasma volume and blood pressure, which during pregnancy may trigger preeclampsia. Renal necrosis may lower glomerular filtration rate and result in proteinuria. One study showed a significant association between high sodium intake and preeclampsia, with an odds ratio (OR) of 6.314—meaning pregnant women with high sodium consumption are 6.3 times more likely to develop preeclampsia (Sabatina et al., 2022).

Exercise

Physical activity during pregnancy has positive effects, including reducing the risk of hypertension and preeclampsia. Exercise helps prevent excessive weight gain, gestational diabetes, and large-for-gestational-age infants—all of which are risk factors for preeclampsia. Exercise reduces muscle sympathetic nerve activity (MSNA) and neurovascular transduction, contributing to lower gestational hypertension risk in active women (Mamuroh & Nurhakim, 2023).

Recent studies also support that stretching exercises are more effective than other forms in lowering blood pressure (Ikebe et al., 2023).

Long-term Follow-up

Preeclampsia is a pregnancy-specific complication associated with increased postpartum risk of cardiovascular disease in both mothers and their offspring. It creates an adverse intrauterine environment—characterized by hypertension, hypoxia, and inflammation. Offspring exposed to preeclampsia in utero are more likely to develop cardiovascular diseases later in life (Yang et al., 2023).

Early-onset preeclampsia (<34 weeks gestation) tends to be more severe and is linked with a higher risk of long-term cardiovascular disease. An increased left

ventricular mass index (LVMI) and diastolic blood pressure in women previously exposed to preeclampsia may signal the development of chronic hypertension. These findings justify the need for routine physical check-ups after preeclampsia, particularly in women with cardiovascular risk factors (Yang et al., 2023).

Conclusion

Management of preeclampsia includes blood pressure control, seizure prevention, pregnancy termination, fluid management, diet, exercise and long-term follow-up. The primary aim of preeclampsia management is to prevent the progression of the condition to the more dangerous eclampsia, and to ensure that delivery can take place with optimal outcomes for both mother and fetus. A comprehensive approach to the management of preeclampsia, both in the short and long term, is necessary to improve the safety and quality of life of mothers and children in the future.

Acknowledgement

The author would like to thank all parties who contributed to the completion of this research.

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