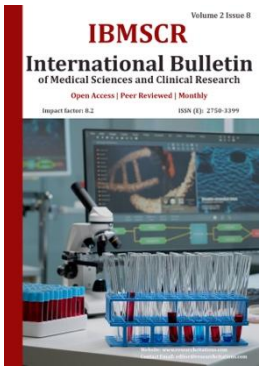

HYPERTENSIVE DISORDERS OF PREGNANCY: EARLY DETECTION AND PREVENTION OF PREECLAMPSIA

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Abstract

This article discusses hypertensive disorders during pregnancy, with a particular focus on the early detection and prevention of preeclampsia. Elevated blood pressure in pregnant women poses serious risks to both maternal and fetal health. Therefore, this paper examines the pathogenesis, clinical manifestations, diagnostic approaches, and modern methods of early detection of preeclampsia. The study also highlights preventive strategies, lifestyle modifications, risk factor management, and the importance of regular medical monitoring in reducing complications. The article is based on Uzbek and international medical literature and provides practical insights useful for clinicians, obstetricians, and medical students.

Keywords

Pregnancy, hypertensive disorders, preeclampsia, gestosis, early detection, prevention, blood pressure, maternal health, fetal development, medical monitoring.

Introduction

Hypertensive disorders of pregnancy HDP are among the most serious complications that can occur during gestation and remain a major cause of maternal and perinatal morbidity and mortality worldwide. These conditions, which include preeclampsia, eclampsia, chronic hypertension, and gestational hypertension, significantly affect both maternal and fetal outcomes. Despite advances in obstetric care, preeclampsia continues to pose a global public health concern, especially in developing countries, where early diagnosis and adequate management are often limited. Preeclampsia is a multisystem disorder characterized by new-onset hypertension and proteinuria after 20 weeks of gestation. It is considered a complex disease with an unclear etiology, involving genetic, immunological, and environmental factors. The pathophysiology of preeclampsia is mainly associated with abnormal placental development and impaired endothelial function, leading to systemic vascular dysfunction and reduced perfusion of vital organs. Early detection of preeclampsia is essential for preventing severe complications such as eclampsia, organ failure, preterm birth, and intrauterine growth restriction. Various biochemical markers, ultrasonographic methods, and clinical assessments are currently used to identify women at high risk. However, there is still a need for more precise and accessible diagnostic tools, particularly in low-resource settings. The prevention of preeclampsia requires a multifaceted approach, including risk assessment before and during pregnancy, regular antenatal check-ups, lifestyle modifications, and timely pharmacological interventions when indicated. Improving awareness among healthcare professionals and pregnant women plays a crucial role in reducing the incidence and severity of hypertensive disorders of pregnancy. This article aims to analyze the causes, mechanisms, and consequences

of hypertensive disorders during pregnancy, focusing on preeclampsia. It also explores modern approaches to early detection and preventive strategies based on recent clinical research and global health recommendations.

Main Part

Hypertensive Disorders of Pregnancy: General Characteristics

Hypertensive disorders of pregnancy HDP represent one of the most common and dangerous complications during gestation. These disorders are usually divided into four main categories: chronic hypertension, gestational hypertension, preeclampsia, and eclampsia. Each of these conditions affects the cardiovascular system and placental circulation, leading to severe maternal and fetal outcomes if not properly managed. Chronic hypertension refers to high blood pressure that existed before pregnancy or develops before 20 weeks of gestation. Gestational hypertension, in contrast, occurs after 20 weeks of pregnancy without the presence of proteinuria. The most severe form of HDP is preeclampsia, characterized by hypertension, proteinuria, and potential involvement of multiple organ systems, including the liver, kidneys, and brain. Eclampsia is a life-threatening complication of preeclampsia, marked by the onset of seizures and, in some cases, coma. The global prevalence of hypertensive disorders of pregnancy is estimated to be between 5% and 10% of all pregnancies, with preeclampsia accounting for the majority of cases. These conditions are responsible for approximately 14% of maternal deaths worldwide, according to the World Health Organization, WHO. In addition to maternal risks, HDP also contributes to perinatal complications such as preterm birth, fetal growth restriction, and perinatal mortality.

Etiology and Pathogenesis of Preeclampsia

The exact cause of preeclampsia remains unclear, but it is known to be a multifactorial disease involving both maternal and placental factors. One of the most accepted theories suggests that preeclampsia originates from abnormal placentation during early pregnancy. In a healthy pregnancy, the trophoblast cells invade the uterine spiral arteries, transforming them into low-resistance vessels that ensure adequate blood flow to the placenta. In preeclampsia, this remodeling process is incomplete, leading to reduced placental perfusion and ischemia. As a result, the placenta releases various antiangiogenic factors, such as soluble fms-like tyrosine kinase-1, and inflammatory mediators into the maternal circulation. These substances cause endothelial dysfunction, vasoconstriction, and oxidative stress, leading to systemic hypertension and organ damage. Genetic predisposition, immune maladaptation between maternal and fetal tissues, obesity, diabetes, and chronic hypertension are also considered major risk factors. The disease usually develops in the second half of pregnancy and can progress rapidly. Without timely diagnosis and management, preeclampsia can lead to eclampsia, HELLP syndrome and even maternal or fetal death.

Early Detection of Preeclampsia

Early detection of preeclampsia is essential for preventing its complications and improving pregnancy outcomes. Traditionally, preeclampsia has been diagnosed based on the presence of hypertension and proteinuria after 20 weeks of gestation. However, current research emphasizes the importance of identifying at-risk women before clinical symptoms appear. Several predictive tools and biomarkers have been developed for early screening. Among them, the most widely studied include. Uterine artery Doppler ultrasound: assesses blood flow resistance and identifies abnormal placental perfusion. Serum biomarkers: such as

placental growth factor, soluble fms-like tyrosine kinase-1, and pregnancy-associated plasma protein A are valuable indicators. Clinical risk assessment: based on maternal age, body mass index, medical history, and previous obstetric complications. Combining these methods improves diagnostic accuracy. For example, low levels of PlGF and high sFlt-1/PlGF ratios have been proven to predict preeclampsia weeks before the onset of symptoms. Regular antenatal checkups, blood pressure monitoring, and urine analysis remain fundamental for early recognition, especially in low-resource settings.

Prevention and Management of Preeclampsia

Preventing preeclampsia involves identifying high-risk women and initiating appropriate interventions early in pregnancy. The most effective preventive strategies include. Low-dose aspirin 75–150 mg/day, recommended for high-risk women starting from 12–16 weeks of gestation. Calcium supplementation: particularly in populations with low dietary calcium intake. Lifestyle modifications: such as maintaining a healthy weight, regular physical activity, and balanced nutrition. Close medical supervision - with frequent monitoring of blood pressure, urine protein, and fetal growth. In mild cases, preeclampsia can be managed with rest, dietary control, and medication to stabilize blood pressure. Severe cases require hospitalization and, sometimes, early delivery of the fetus if maternal or fetal health is at risk. Magnesium sulfate remains the drug of choice for preventing eclamptic seizures. Public awareness and education play an important role in prevention. Pregnant women should be informed about early warning signs such as headaches, visual disturbances, swelling of the hands or face, and sudden weight gain. Timely consultation with healthcare providers can prevent severe complications.

Clinical and Public Health Significance

Hypertensive disorders of pregnancy represent not only a clinical challenge but also a public health concern. Effective management requires collaboration among obstetricians, midwives, and primary healthcare workers. Implementing standardized screening protocols and ensuring access to prenatal care can significantly reduce maternal and perinatal mortality rates. In developing countries, limited healthcare access, low awareness, and late diagnosis remain major obstacles. Therefore, health systems should focus on preventive education, regular screening programs, and training of healthcare professionals in the management of preeclampsia and other hypertensive disorders. Furthermore, continued research into molecular mechanisms and new biomarkers may lead to improved diagnostic and therapeutic options, ultimately enhancing maternal and neonatal outcomes.

Conclusion

Hypertensive disorders of pregnancy, particularly preeclampsia, remain one of the leading causes of maternal and perinatal complications across the world. Despite advances in obstetric care, early detection and prevention continue to be the most effective strategies for reducing the incidence and severity of this condition. Understanding the pathophysiology of preeclampsia — from abnormal placentation to endothelial dysfunction — allows healthcare professionals to develop more accurate diagnostic and preventive approaches. Timely screening of high-risk women, regular blood pressure monitoring, and the use of predictive biomarkers such as PlGF and sFlt-1 can significantly improve maternal and fetal outcomes. Preventive measures, including low-dose aspirin therapy, calcium supplementation, and lifestyle modifications, play an essential role in minimizing risks. Moreover, raising public

awareness about the symptoms of preeclampsia and ensuring access to quality prenatal care are crucial components of effective management. Preeclampsia should be viewed not only as an obstetric complication but also as a reflection of a woman's overall cardiovascular health. Women who experience preeclampsia are at increased risk of developing chronic hypertension and cardiovascular diseases later in life. Therefore, postpartum follow-up and long-term health monitoring are equally important for ensuring maternal well-being. In conclusion, the early detection and prevention of preeclampsia require a multidisciplinary approach involving obstetricians, midwives, laboratory specialists, and public health experts. Strengthening antenatal care systems, promoting evidence-based practices, and investing in community education can greatly reduce the global burden of hypertensive disorders of pregnancy and safeguard the health of mothers and their children.

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