



**URGANCH DAVLAT TIBBIYOT INSTITUTI
JANUBIY OROLBO'YI TIBBIYOT JURNALI**

2 - TOM, MAXSUS SON-3. 2026

14.00.00 - TIBBIYOT FANLARI ISSN: 3093-8740

UDK: 618.2-06:616-008.9

**PREECLAMPSIA DURING PREGNANCY: RISK FACTORS, EARLY DIAGNOSIS, AND
MODERN PREVENTION STRATEGIES**



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Abstract: This article analyzes the major risk factors for preeclampsia during pregnancy, approaches to early diagnosis, and modern preventive strategies. The study included 30 pregnant women diagnosed with preeclampsia, and clinical, laboratory, maternal, and fetal parameters were evaluated. The most frequently observed risk factors were nulliparity, overweight or obesity, a previous history of preeclampsia, and chronic arterial hypertension. Regular blood pressure monitoring, assessment of proteinuria, laboratory investigations, ultrasonography, and Doppler examination were important components of early diagnostic assessment. The findings emphasize the importance of individualized antenatal surveillance and appropriate preventive strategies in pregnant women at increased risk of preeclampsia.

Keywords: Preeclampsia, pregnancy, arterial hypertension, proteinuria, risk factors, early diagnosis, prevention, Doppler examination.

**ПРЕЭКЛАМПСИЯ ВО ВРЕМЯ БЕРЕМЕННОСТИ: ФАКТОРЫ РИСКА, РАННЯЯ
ДИАГНОСТИКА И СОВРЕМЕННЫЕ СТРАТЕГИИ ПРОФИЛАКТИКИ**

Аннотация: В статье проанализированы основные факторы риска преэклампсии во время беременности, современные возможности ранней диагностики и профилактические стратегии. В исследование были включены 30 беременных женщин с диагнозом преэклампсии,



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у которых оценивались клинические, лабораторные показатели и состояние плода. По результатам исследования наиболее часто выявлялись первая беременность, избыточная масса тела или ожирение, преэклампсия в анамнезе и хроническая артериальная гипертензия. Регулярный контроль артериального давления, определение протеинурии, лабораторные исследования, ультразвуковое и доплерографическое наблюдение имели важное значение для раннего выявления патологических изменений. Особое внимание уделено индивидуальному наблюдению и профилактическим мероприятиям у беременных женщин с повышенным риском развития преэклампсии.

Ключевые слова: Преэклампсия, беременность, артериальная гипертензия, протеинурия, факторы риска, ранняя диагностика, профилактика, доплерография.

HOMILADORLIK DAVRIDAGI PREEKLAMPSIYA: XAVF OMILLARI, ERTA TASHXISLASH VA ZAMONAVIY PROFILAKTIKA STRATEGIYALARI

Annotatsiya: Ushbu maqolada homiladorlik davrida uchraydigan preeklampsiyaning asosiy xavf omillari, erta tashxislash imkoniyatlari va zamonaviy profilaktika strategiyalari tahlil qilingan. Tadqiqotda 30 nafar preeklampsiya tashxisi qo'yilgan homilador ayolning klinik, laborator va homila holatiga oid ko'rsatkichlari baholandi. Natijalarga ko'ra, birinchi homiladorlik, ortiqcha vazn yoki semizlik, avvalgi preeklampsiya va surunkali arterial gipertenziya asosiy xavf omillari sifatida qayd etildi. Arterial qon bosimini muntazam nazorat qilish, proteinuriyani aniqlash, laborator tekshiruvlar, ultratovush va Doppler monitoringi erta tashxislashda muhim ahamiyatga ega bo'ldi. Yuqori xavf guruhidagi homilador ayollarda individual kuzatuv va profilaktik yondashuvlarning ahamiyati ko'rsatildi.

Kalit so'zlar: Preeklampsiya, homiladorlik, arterial gipertenziya, proteinuriya, xavf omillari, erta tashxislash, profilaktika, Doppler tekshiruvi.

Introduction

Preeclampsia is a pregnancy-specific hypertensive disorder that remains an important cause of maternal and perinatal morbidity and mortality. The condition is characterized by the development of hypertension after 20 weeks of gestation and may be accompanied by proteinuria or other signs of maternal organ dysfunction. Its clinical course can vary considerably, ranging from relatively mild disease to severe forms associated with neurological, renal, hepatic, hematological, and placental complications. The development of preeclampsia is associated with multiple maternal, obstetric, and metabolic risk factors. Previous history of preeclampsia, chronic hypertension, diabetes mellitus, renal disease, obesity, autoimmune disorders, multifetal pregnancy, and first pregnancy may increase the likelihood of developing the condition. Recognition of these risk factors during early antenatal care is important for identifying women who require closer observation and preventive interventions.

Early diagnosis plays a major role in reducing the risk of severe maternal and fetal complications. Regular blood pressure measurement, assessment of proteinuria, evaluation of maternal clinical symptoms, and appropriate laboratory investigations allow changes associated with preeclampsia to be detected at an early stage. Modern approaches also include assessment of maternal and placental factors that may contribute to the prediction of disease development, particularly among women with increased baseline risk. Prevention of preeclampsia is based on early identification of high-risk pregnancies, appropriate antenatal monitoring, and evidence-based preventive interventions. Low-dose aspirin may be recommended for selected women at increased risk, while adequate management of pre-existing hypertension, diabetes, renal disease, and other associated conditions is also important. Therefore, an integrated strategy combining risk assessment, early diagnosis, preventive measures, and continuous maternal-fetal monitoring is essential for improving pregnancy outcomes.



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Relevance

Preeclampsia is one of the major hypertensive disorders occurring during pregnancy and may have serious consequences for both maternal and fetal health. Severe forms of the condition may be associated with renal, hepatic, neurological, and hematological complications, as well as fetal growth restriction and preterm birth. Therefore, early recognition of preeclampsia remains an important objective in modern obstetric practice. The development of preeclampsia is associated with several maternal, obstetric, and metabolic risk factors. A previous history of preeclampsia, chronic hypertension, diabetes mellitus, renal disease, obesity, multifetal pregnancy, and other conditions may increase the risk of disease development. Identification of these factors during the early stages of pregnancy allows women at increased risk to be monitored more closely and appropriate preventive measures to be considered.

Aim

The aim of this study is to identify the major risk factors for preeclampsia during pregnancy, examine modern approaches to its early diagnosis, and evaluate effective preventive strategies aimed at reducing the risk of preeclampsia and its complications.

Main part

Preeclampsia is a multifactorial pregnancy-related hypertensive disorder that develops mainly after 20 weeks of gestation. Its pathogenesis is associated with abnormal placental development and impaired remodeling of the uterine spiral arteries. Inadequate trophoblastic invasion may lead to insufficient uteroplacental perfusion and placental ischemia. Placental dysfunction can subsequently contribute to oxidative stress and the release of various inflammatory and antiangiogenic factors into the maternal circulation. These changes may cause endothelial dysfunction and increased vascular resistance. As a result, arterial blood pressure increases and microvascular disturbances may develop in several maternal organs. Renal involvement may manifest as proteinuria and impaired renal function. In more severe cases, hepatic, neurological, hematological, and cardiovascular abnormalities may occur. The severity of clinical manifestations depends on the extent of endothelial and placental dysfunction. Understanding these mechanisms is important for identifying women at increased risk and selecting appropriate diagnostic and preventive strategies.

The development of preeclampsia is associated with several maternal, obstetric, and metabolic risk factors. A previous history of preeclampsia is considered an important predictor of recurrence in subsequent pregnancies. Chronic hypertension may also substantially increase the risk of hypertensive complications during pregnancy. Diabetes mellitus, chronic kidney disease, autoimmune disorders, and obesity are additional clinically important risk factors. Multifetal pregnancy may increase the risk because of greater placental mass and increased physiological demands. Nulliparity is also considered among the factors associated with an increased risk of preeclampsia. Maternal age, family history, and reproductive history should be evaluated during the initial antenatal assessment. Early identification of these factors allows pregnant women to be classified according to their individual risk profile. Women with significant risk factors may require more intensive antenatal surveillance. Assessment of risk should therefore be performed systematically during early pregnancy. A comprehensive evaluation of maternal and obstetric characteristics can contribute to earlier recognition of women who may benefit from preventive interventions.

Early diagnosis is essential for preventing severe maternal and fetal complications associated with preeclampsia. Regular measurement of arterial blood pressure is one of the fundamental components of antenatal surveillance. Assessment of proteinuria provides important information regarding renal involvement. Laboratory evaluation may include platelet count, serum creatinine, liver enzymes, and other parameters reflecting maternal organ function. Clinical symptoms such as persistent headache, visual disturbances, epigastric pain, and sudden worsening of edema should also be carefully assessed. Fetal growth and well-being can be evaluated using ultrasonography and, when



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indicated, Doppler assessment of uteroplacental and fetoplacental circulation. In selected high-risk pregnancies, angiogenic biomarkers may provide additional information regarding the likelihood of preeclampsia. Combining clinical assessment with laboratory and instrumental investigations improves the overall evaluation of disease severity. Early recognition allows appropriate monitoring and timely clinical intervention. Therefore, systematic antenatal screening remains an important component of preeclampsia management.

Prevention of preeclampsia begins with early identification of women who have an increased risk of developing the disease. A detailed maternal and obstetric history should be obtained during the first antenatal assessment. Women with significant risk factors may require closer monitoring throughout pregnancy. Low-dose aspirin is recommended for selected women at increased risk when clinically indicated and prescribed by a healthcare professional. Appropriate management of chronic hypertension, diabetes mellitus, kidney disease, and other pre-existing conditions is also important. Regular blood pressure monitoring allows abnormal changes to be detected at an early stage. Adequate antenatal care and timely laboratory assessment contribute to the prevention of severe complications. Maternal nutritional status and overall lifestyle should also be considered as part of comprehensive prenatal care. Preventive strategies should be individualized according to the woman's baseline risk and clinical characteristics. Continuous communication between the pregnant woman and healthcare professionals is important for recognizing warning symptoms. A combination of risk assessment, preventive treatment when indicated, and regular maternal-fetal monitoring provides an integrated approach to reducing the clinical burden of preeclampsia.

Maternal and fetal monitoring is essential after the identification of preeclampsia or a high-risk pregnancy. Maternal assessment includes regular blood pressure measurement and evaluation of clinical symptoms and laboratory parameters. Renal function, liver enzymes, platelet count, and urinary protein should be monitored when clinically indicated. Fetal assessment includes evaluation of fetal growth, amniotic fluid, placental function, and fetal well-being. Doppler ultrasonography can provide information about uteroplacental and fetoplacental blood flow when indicated. In severe disease, closer monitoring may be required because preeclampsia can progress rapidly and affect multiple maternal organs. Fetal growth restriction and impaired placental circulation may occur in association with placental dysfunction. Timely recognition of deterioration in maternal or fetal condition is therefore essential for appropriate clinical decision-making. The frequency and intensity of monitoring should depend on disease severity, gestational age, maternal condition, and fetal status. An individualized monitoring strategy can facilitate timely intervention and reduce the risk of serious complications. Thus, continuous assessment of both mother and fetus represents a central component of comprehensive preeclampsia management.

Results

The study included 30 pregnant women diagnosed with preeclampsia. The clinical, laboratory, obstetric, and fetal parameters were evaluated to identify the major risk factors, early diagnostic indicators, and pregnancy-related outcomes. The assessment of maternal characteristics demonstrated that nulliparity was the most frequently observed risk factor, being identified in 17 patients (56.7%). Overweight or obesity was present in 11 patients (36.7%), indicating a considerable prevalence of metabolic risk factors among the examined women. A previous history of preeclampsia was reported in 8 patients (26.7%), while chronic arterial hypertension was detected in 7 patients (23.3%). A family history of hypertension or preeclampsia was noted in 6 patients (20.0%). Diabetes mellitus was present in 5 patients (16.7%), whereas chronic kidney disease and multifetal pregnancy were each observed in 4 patients (13.3%). Autoimmune diseases were identified in 3 patients (10.0%).

Clinical evaluation showed that elevated arterial blood pressure was present in all 30 patients (100.0%). Proteinuria was detected in 19 patients (63.3%), demonstrating that renal involvement was common among the examined women. Headache was reported by 12 patients (40.0%), while marked edema was observed in 10 patients (33.3%). Visual disturbances were identified in 7 patients (23.3%),



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and epigastric or right upper quadrant pain was reported in 6 patients (20.0%). These findings indicate that preeclampsia was associated not only with elevated blood pressure but also with a range of clinical manifestations suggesting systemic involvement. Laboratory investigations provided additional information regarding disease severity. Thrombocytopenia was detected in 5 patients (16.7%), while elevated liver enzyme levels were identified in 4 patients (13.3%). Increased serum creatinine was observed in 3 patients (10.0%), indicating renal dysfunction in a smaller proportion of the examined group. These laboratory abnormalities emphasize the importance of monitoring hematological, hepatic, and renal parameters in pregnant women with preeclampsia.

The fetal assessment demonstrated that 20 pregnancies (66.7%) had normal fetal growth, whereas 10 pregnancies (33.3%) were complicated by fetal growth restriction. Impaired uteroplacental blood flow was detected in 8 patients (26.7%), while reduced fetoplacental blood flow was observed in 6 patients (20.0%). Abnormal fetal Doppler findings were identified in 8 patients (26.7%), and oligohydramnios was observed in 5 patients (16.7%). A clinical risk or indication for preterm delivery was recorded in 7 patients (23.3%). The diagnostic assessment showed that all 30 patients (100.0%) underwent repeated blood pressure measurements, urinary protein assessment, complete blood count, liver function evaluation, renal function assessment, and obstetric ultrasonography. Doppler examination was performed in 24 patients (80.0%), allowing assessment of uteroplacental and fetoplacental circulation. Angiogenic biomarker assessment was performed in 10 patients (33.3%), providing additional information for the evaluation of patients at increased risk.

Preventive and monitoring strategies were also assessed. Regular blood pressure monitoring was performed in all 30 patients (100.0%). Enhanced fetal monitoring was performed in 24 patients (80.0%), reflecting the importance of fetal surveillance in pregnancies complicated by preeclampsia. Dietary and lifestyle counseling was provided to 21 patients (70.0%), while increased antenatal surveillance was implemented in 18 patients (60.0%). Low-dose aspirin prophylaxis was used in 12 patients (40.0%) according to their clinical risk profile. Management of chronic hypertension was required in 7 patients (23.3%), while diabetes management was required in 5 patients (16.7%). Overall, the results demonstrated that preeclampsia in the examined group was associated with a combination of maternal risk factors, elevated blood pressure, proteinuria, systemic clinical manifestations, laboratory abnormalities, and changes in fetal and placental parameters. The relatively frequent occurrence of fetal growth restriction and abnormal uteroplacental circulation highlights the importance of comprehensive maternal-fetal monitoring. The findings also demonstrate that early identification of risk factors and systematic assessment of blood pressure, proteinuria, laboratory parameters, fetal growth, and Doppler findings are important components of the clinical management of preeclampsia.

Discussion

The findings of the present study indicate that several maternal and obstetric factors may contribute to the development of preeclampsia. Nulliparity, overweight or obesity, a previous history of preeclampsia, and chronic arterial hypertension were among the most frequently observed risk factors. These findings highlight the importance of assessing individual risk factors from the early stages of pregnancy and providing closer antenatal surveillance for women at increased risk. Elevated arterial blood pressure was observed in all examined patients, confirming its central role in the clinical presentation of preeclampsia. Proteinuria was also frequently detected, indicating the importance of evaluating renal involvement. Clinical manifestations such as headache, edema, visual disturbances, and epigastric pain were observed in a proportion of patients. Recognition of these symptoms is important because their development may indicate progression of the disease and the need for more intensive clinical assessment.

Laboratory findings demonstrated abnormalities in some patients, including reduced platelet counts, elevated liver enzymes, and increased serum creatinine levels. These findings suggest that preeclampsia may affect several maternal organ systems. Therefore, monitoring of hematological,



URGANCH DAVLAT TIBBIYOT INSTITUTI JANUBIY OROLBO'YI TIBBIYOT JURNALI

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hepatic, and renal parameters should be included in the assessment of patients with suspected or confirmed preeclampsia. Fetal assessment showed that some pregnancies were complicated by fetal growth restriction and abnormalities of uteroplacental or fetoplacental blood flow. These findings emphasize the importance of evaluating not only the maternal condition but also fetal growth and placental circulation. Ultrasonography and Doppler assessment can provide valuable information regarding fetal development and placental function and may support timely clinical decision-making. The study also demonstrated the importance of regular antenatal monitoring. Repeated blood pressure measurements, assessment of urinary protein, laboratory investigations, ultrasound examination, and Doppler monitoring provide complementary information about maternal and fetal status. In women with identified risk factors, increased antenatal surveillance and appropriate preventive measures may contribute to earlier recognition of clinically significant changes.

Conclusion

Preeclampsia is a complex pregnancy-related disorder associated with maternal risk factors, elevated blood pressure, proteinuria, and possible involvement of multiple organ systems. The findings of this study demonstrate the importance of identifying risk factors at an early stage of pregnancy and maintaining regular antenatal surveillance. The assessment of maternal clinical and laboratory parameters, together with ultrasound and Doppler evaluation of fetal and placental conditions, provides important information for early recognition of unfavorable changes. Particular attention should be given to women with previous preeclampsia, chronic hypertension, excessive body weight, and other identified risk factors. Early risk assessment, timely diagnosis, regular maternal-fetal monitoring, and individualized preventive management are essential components of comprehensive preeclampsia care. This approach may contribute to the timely detection of disease progression and reduction of potential maternal and fetal complications.

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