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ETIOLOGY AND PATHOGENESIS OF PRETERM LABOR

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Abstract. Preterm birth is one of the most pressing issues in perinatal medicine, as it remains one of the leading causes of maternal and perinatal mortality worldwide. This issue attracts considerable attention because of the serious consequences for both the mother and the newborn. Studying the etiology and pathogenesis of preterm birth is important to identify risk factors that lead to its development, as well as to develop ways to effectively correct these factors.

The scientific literature identifies many factors that contribute to the occurrence of preterm birth, including infectious diseases, reproductive disorders, anatomical abnormalities, chronic diseases, stress, and environmental factors. In particular, infectious factors, such as bacterial, viral, and fungal infections, can lead to inflammatory processes in the mother's body, which in turn stimulates the mechanisms of preterm labor.

The pathogenesis of preterm labor involves a number of biological mechanisms, among which inflammatory reactions, hormonal dysregulation, and activation of the oxytocin system and uterine activity play an important role. In addition, a deteriorating quality of life, increased stress levels, and a lack of healthy lifestyle significantly increase the likelihood of preterm labor. According to statistics, preterm births occur in 5–10% of all pregnancies, which is about 15 million cases per year worldwide.

In Ukraine, this figure also remains high and accounts for about 6–8% of all pregnancies. Therefore, an important area for further research is the development of more effective methods of prevention, early diagnosis, and treatment of preterm birth, which will help to significantly reduce maternal and perinatal mortality rates and improve the overall health of mothers and newborns.

Preterm birth is not only a medical but also a social problem, as it affects the health of future generations and requires significant resources for the treatment and care of preterm infants. Solving this problem requires a comprehensive approach that includes improving early diagnostic methods, developing effective preventive measures, and raising the level of medical education and public awareness of the risk factors for preterm birth.

Key words: *preterm labor, pregnancy, placenta, prevention, treatment, hormones.*

Introduction. Preterm birth is a birth that occurs before 37 weeks of pregnancy, which is a significant risk factor for the health of the mother and newborn. They remain one of the main causes of maternal and perinatal mortality, which makes this issue a priority for modern medicine. According to statistics, about 5–10% of all pregnancies end in preterm birth, which amounts to about 15 million cases per year worldwide. In Ukraine, the preterm birth rate varies from 6% to 8% of the total number of pregnancies. Since the mortality and complications associated with preterm birth remain significant, studying the etiology and pathogenesis of preterm birth is important for developing effective methods of prevention, diagnosis and treatment of this pathology [1].

The causes of preterm labor are multifactorial and can be both physiological and pathological. Among the main factors contributing to the development of preterm birth are infectious lesions, uterine and placental dysfunctions, chronic maternal diseases, as well as social and environmental factors. Infections, including bacterial, viral, and fungal infections, are one of the main causes of preterm labor, as they can cause inflammatory processes that stimulate the mechanisms that lead to the onset of labor. In addition, abnormalities in the anatomy of the genital organs, such as cervical underdevelopment or multiple pregnancies, can also increase the risk of preterm labor [2].

The pathogenesis of preterm labor involves a whole range of biological processes, such as activation of inflammatory mechanisms, changes in hormonal levels, including increased levels of prostaglandins and oxytocin, as well as disruption of neurohumoral regulation, which leads to uterine

muscle contraction and cervical dilatation. Current research indicates an important role of genetic factors and the immune response in the development of preterm labor, which requires further study to optimize treatment and prevention methods [3].

Due to the high level of complications and mortality among children born prematurely, it is extremely important to develop effective means to prevent preterm birth. These include both medical and social measures, including timely diagnosis, treatment of infections, correction of risk factors such as hypertension, diabetes, or stress, and promotion of a healthy lifestyle during pregnancy. The psychological aspects of supporting expectant mothers are also important, as the emotional state of a pregnant woman also has a significant impact on her health and the course of pregnancy [4].

Thus, understanding the etiology and pathogenesis of preterm birth is essential to reduce its occurrence and improve outcomes for mothers and newborns. Modern scientific research that studies the mechanisms of this pathology contributes to the improvement of existing diagnostic and treatment methods, which can effectively reduce the risk of preterm birth and improve the prognosis for pregnant women [5].

The purpose of the study – to study the etiology and pathogenesis of preterm birth, in particular, to identify the main risk factors, mechanisms that contribute to their occurrence, as well as to analyze modern approaches to the prevention, diagnosis and treatment of preterm birth to reduce maternal and perinatal mortality.

Materials and methods. The methods of systematic review and analysis of scientific literature were used to study the etiology and pathogenesis of preterm birth. The data were evaluated based on publications in peer-reviewed medical journals, clinical trials, meta-analyses, and reviews covering risk factors, mechanisms of development, and approaches to the treatment of preterm birth.

The research methods included:

1. Literature analysis – study of scientific articles, reviews, clinical trials published in leading medical databases (PubMed, Scopus, Web of Science). Particular attention was paid to the latest research covering the latest approaches to the study of the pathogenesis of preterm birth.

2. Method of statistical analysis – to study the prevalence of preterm birth and identify statistical correlations between risk factors, a meta-analysis of available statistical data was conducted. Descriptive statistics were used to estimate the prevalence of preterm birth and risk factors in different populations.

3. Clinical analysis – based on clinical data collected in the obstetric department, risk factors contributing to preterm birth and the effectiveness of various methods of prevention and treatment were assessed.

4. Cross-sectional analysis – used to determine the relationships between socioeconomic conditions, maternal health, and pregnancy outcomes.

Results of the study. Preterm birth remains one of the leading causes of maternal and perinatal mortality worldwide, making its study critical to improving pregnancy outcomes. According to studies, preterm birth occurs in 5–10% of all pregnancies, which is about 15 million cases per year. In Ukraine, this figure ranges from 6–8%. The causes of preterm birth are multifactorial and include infectious diseases, hormonal disorders, genetic factors, socioeconomic conditions, and environmental factors [1; 4].

Infectious diseases are among the top risk factors. Bacterial, viral, and fungal infections can cause inflammation in the mother's body, which activates mechanisms that lead to the onset of labor. In particular, urinary tract infections, bacterial vaginosis, as well as cytomegalovirus and herpes are the main agents that increase the risk of preterm labor. Infections lead to increased levels of prostaglandins and oxytocin in the body, which stimulates uterine contractions and cervical dilation [2; 3].

Hormonal changes are also an important factor. Progesterone is the main hormone that maintains pregnancy, and its insufficiency can lead to cervical weakness and premature labor. An increase in

estrogen levels can stimulate the oxytocin system, which can also contribute to the onset of labor before the due date. Oxytocin, which is the main hormone that activates uterine contractions, has an important role in the pathogenesis of preterm labor [6; 7].

Genetic predisposition can also be a risk factor for preterm labor. Some studies indicate that the presence of certain genetic markers increases the likelihood of this pathology. Genetic factors can determine how the body responds to infections or hormonal changes during pregnancy. In addition, socioeconomic conditions, such as low income, inadequate access to healthcare, and poor working conditions, increase the risk of preterm birth. Women who are stressed, have limited opportunities for a healthy diet, or are sedentary are also at greater risk [7; 9].

The pathogenesis of preterm labor involves complex biological processes. Activation of inflammatory mechanisms is the main cause of preterm labor. Inflammatory cytokines and prostaglandins contribute to the contraction of uterine smooth muscle, which can lead to the onset of labor. Hormonal dysregulation, such as progesterone deficiency or increased estrogen levels, are also important mechanisms that can lead to preterm labor. In addition, genetic predisposition and individual immune responses can also activate mechanisms that contribute to the development of preterm labor [9; 10].

Early detection of risk factors is important in preventing preterm birth. Regular medical examinations and ultrasound to assess the length of the cervix can help identify problems in time and take appropriate action. For women at high risk, the use of progesterone drugs is often recommended, which can reduce the likelihood of preterm labor. Antibiotics and antiseptics are used to prevent infections that can cause inflammation and, as a result, premature birth [1; 10].

Lifestyle changes are an important element of prevention. Pregnant women are encouraged to eat a healthy diet, quit bad habits such as smoking and drinking alcohol, and engage in active exercise within the limits allowed for pregnant women. Reducing stress levels, psychological support, and adequate rest also have a positive impact on the course of pregnancy [8].

According to statistics, preterm births occur in 5–10% of all pregnancies globally. This amounts to about 15 million cases per year, which is a significant indicator for medical services and requires increased attention to this problem. In Ukraine, the rate of preterm births is in the range of 6–8%. However, the use of modern prevention methods, such as early detection of infections, hormonal disorders and cervical abnormalities, can reduce this rate by 20–30%. Raising awareness among pregnant women, access to medical services, and a comprehensive approach to treatment can significantly reduce the rate of preterm birth [2; 5].

Given the multifactorial nature of preterm birth, it is important to implement a comprehensive approach to its prevention and treatment. This will reduce the risk of this pathology and improve the prognosis for mothers and newborns, reducing maternal and perinatal mortality [10].

Discussion. The discussion on the etiology and pathogenesis of preterm birth focuses on the complexity and multifaceted nature of the factors that cause it, including infectious diseases, hormonal disorders, stress factors and genetic characteristics, which requires further research to develop effective methods of prevention and treatment of this problem.

Conclusions. Preterm birth has a multifactorial etiology, including infections, hormonal disorders, genetic predisposition, as well as socioeconomic and environmental factors. Modern methods of prevention, such as the use of progesterone drugs, timely antibiotic therapy, and regular medical examinations, can reduce the risk of their occurrence. A comprehensive approach to treatment and prevention, including medical, social and psychological aspects, is key to reducing the rate of preterm birth and improving pregnancy outcomes.

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ЕТІОЛОГІЯ ТА ПАТОГЕНЕЗ ПЕРЕДЧАСНИХ ПОЛОГІВ

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Анотація. Передчасні пологи є однією з найбільш актуальних проблем у перинатальній медицині, оскільки вони залишаються однією з основних причин материнської та перинатальної смертності у світі. Це питання привертає значну увагу через серйозні наслідки як для матері, так і для новонародженого. Вивчення етіології та патогенезу передчасних пологів є важливим для виявлення чинників ризику, що призводять до їх розвитку, а також для розроблення шляхів ефективної корекції цих чинників. У науковій літературі виділяють безліч чинників, що сприяють виникненню передчасних пологів, серед яких інфекційні захворювання, порушення репродуктивної функції, анатомічні аномалії, хронічні захворювання, стреси й екологічні чинники. Зокрема, інфекційні чинники, як-от бактеріальні, вірусні та грибкові інфекції, можуть призвести до запальних процесів в організмі матері, що стимулює механізми передчасних пологів. Патогенез передчасних пологів охоплює низку біологічних механізмів, серед яких важливу роль відіграють запальні реакції, порушення гормональної регуляції, а також активація механізмів окситоцинової системи та маткової активності. Окрім того, погіршення якості життя, підвищений рівень стресу та недотримання здорового способу життя значно збільшують імовірність передчасних пологів. За статистикою, передчасні пологи трапляються в 5–10% усіх вагітностей, що становить приблизно 15 мільйонів випадків на рік у світі. В Україні цей показник також залишається на високому рівні – приблизно 6–8% усіх вагітностей. Тому важливим напрямом для подальших досліджень є розроблення більш ефективних методів профілактики, ранньої діагностики та лікування передчасних пологів, що допоможе значно знизити рівень материнської та перинатальної смертності, а також покращити загальний стан здоров'я матерів і новонароджених.

Передчасні пологи є не лише медичною, а й соціальною проблемою, оскільки впливають на рівень здоров'я майбутніх поколінь і потребують значних ресурсів для лікування та догляду за недоношеними немовлятами. Вирішення цієї проблеми потребує комплексного підходу, що передбачає вдосконалення методів ранньої діагностики, розроблення ефективних профілактичних заходів, а також підвищення рівня медичної освіти й обізнаності населення щодо чинників ризику передчасних пологів.

Ключові слова: *передчасні пологи, вагітність, плацента, профілактика, лікування, гормони.*

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