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| Research Article

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Characteristics of Hemostasis and Fetoplacental Circulation in Pregnant Women with Antiphospholipid Syndrome

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Abstract: Antiphospholipid syndrome (APS) leads to significant disturbances in hemostasis and fetoplacental circulation during pregnancy, increasing the risk of recurrent pregnancy loss. This study aimed to evaluate the pathogenic role of antiphospholipid antibodies, β2-glycoprotein I, and lupus anticoagulant during early gestation. Pregnant women with APS demonstrated marked hypercoagulation, endothelial dysfunction, and progressive placental ischemia. Ultrasound parameters and laboratory markers showed high diagnostic value for early detection of fetoplacental dysfunction. Preconception preparation and comprehensive monitoring proved essential in reducing pregnancy complications. The findings provide a foundation for developing improved clinical approaches to managing APS-associated pregnancies.

Keywords: Antiphospholipid syndrome, hemostasis, fetoplacental circulation, recurrent pregnancy loss, β2-glycoprotein I, lupus anticoagulant, trophoblast invasion, placental insufficiency, hypercoagulation, reproductive losses.

Reproductive loss among women with antiphospholipid syndrome (APS) remains one of the most urgent problems in modern obstetrics. Despite significant progress in perinatal medicine, the early diagnosis and prevention of pregnancy complications associated with APS require further improvement. According to global statistics reported by the WHO (2019), miscarriage rates constitute 7–10% in developed countries and 15–20% in developing nations. In 76–80% of pregnancy pathologies, APS plays a contributing role and poses a serious threat to maternal and fetal health. Its involvement is noted in placental insufficiency (up to 50%), fetal growth restriction (up to 46%), thrombosis (53.1%), threatened miscarriage (46%), preterm birth (42%), and preeclampsia (46.2%). These conditions arise primarily due to microthrombi formation within placental vessels, which is a hallmark of APS–related pathology.

In recent years, extensive research has been dedicated to understanding the role of antiphospholipid antibodies in disrupting early gestational processes, including impaired trophoblast invasion, placental dysfunction, and fetal hypoxia. Studies indicate that APS adversely affects the maternal–placental–fetal circulation system, promoting prothrombotic changes, endothelial dysfunction, and impaired uteroplacental blood flow. These pathophysiological mechanisms ultimately increase the likelihood of early pregnancy loss, fetal growth restriction, and perinatal morbidity.

Degree of Scientific Investigation

Previous international studies have established the association between APS and recurrent pregnancy loss. The presence of antiphospholipid autoantibodies—particularly IgG and IgM isotypes against β2–glycoprotein I—has been confirmed as a key pathogenic factor leading to implantation failure and miscarriage (Kaldybekova A.K., Ashirbekova A.M., 2019; Kornyushina E.A., 2021; Skeith L. et al., 2021). Current evidence demonstrates that APS enhances platelet activation, disrupts coagulation balance, and intensifies endothelial injury. Such abnormalities contribute to ischemic changes in the chorionic villi, impair placental development, and ultimately lead to fetal hypoxia and growth restriction (Sidelnikova V.M., 2021; Mormile I., 2021; Meroni P.L., 2020).

Several studies have also identified significant correlations among hemostasiological indicators, cytokine status, and placental blood flow measurements in pregnant women diagnosed with APS (Maniyezova G.M., 2019). Hypercoagulability is especially prominent during the first trimester, significantly increasing the risk of thrombotic and inflammatory complications (Meng H., Yalavarthi S., 2019; Gaynetdinova D.D., 2020).

A growing body of literature concludes that antiphospholipid antibodies directly target syncytiotrophoblast and cytotrophoblast cells, inhibiting cell fusion and impairing trophoblast invasion. This leads to deficiencies in placental hormone production and inadequacies in implantation and placental development (Kravchenko E.N., Goncharova A.A., 2020; Cervera R., 2019). Lupus anticoagulant—a heterogeneous class of immunoglobulins—binds to phospholipid-binding proteins such as prothrombin and β2–glycoprotein I, intensifying hypercoagulability and contributing to adverse pregnancy outcomes (Makatsariya A.D., Bitsadze V.O., 2018; Sukalo A.V., 2018).

Despite global advancements, regional studies indicate that reliable, efficient, and cost–effective diagnostic methods for APS–associated pregnancy complications remain underdeveloped, particularly in areas such as the Bukhara region. This underlines the importance and scientific relevance of conducting local research to improve maternal health outcomes.

Aim of the Research

To investigate hemostasis parameters and fetoplacental blood flow characteristics in pregnant women with antiphospholipid syndrome, with the goal of improving early diagnosis and reducing reproductive losses.

Research Objectives

1. To identify and evaluate the role of antiphospholipid antibodies in early gestation among pregnant women with a history of reproductive loss.

2. To determine the role of APS–related mechanisms in the development of placental insufficiency and assess the effectiveness of preconception preparation for its prevention.

3. To justify the diagnostic value of biochemical and hemostasiological markers in the early detection of fetoplacental dysfunction.

4. To develop evidence–based recommendations for the prevention of APS–related obstetric complications.

Object of the Study

The study involved:

60 pregnant women residing in the Bukhara region with a history of recurrent pregnancy loss, and 20 pregnant women with physiological, uncomplicated pregnancies serving as controls.

Research Methods

General clinical and laboratory analyses, biochemical assessments, coagulation profiling (hemostasiogram), ultrasound diagnostics, and statistical analysis were used.

Scientific and Practical Significance

The practical significance of the study lies in the potential to use obtained data for improving diagnostic and treatment protocols for women with recurrent miscarriage. Early identification of biochemical markers and implementing enhanced preconception strategies can significantly reduce reproductive losses, improve pregnancy outcomes, and enhance overall quality of life.

The scientific significance includes establishing the predictive value of antiphospholipid antibodies, β2–glycoprotein I, and lupus anticoagulant in the pathogenesis of recurrent miscarriage, thereby contributing to improved diagnostic guidelines in modern obstetrics.

The results will be implemented into clinical practice in the form of methodological guidelines, patents, and informational leaflets. Publications are intended for national and international scientific journals as well as conferences and symposia.

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