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LABORATORY METHODS FOR EARLY DETECTION OF AUTOIMMUNE HEPATITIS IN MODERN MEDICINE

Tairova Guzal Babakulovna – PhD, Senior Lecturer
Arabova Feride Abdikhalimovna – Resident
Tashkent Medical Academy (Tashkent, Uzbekistan)

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Abstract:

Autoimmune hepatitis predominantly occurs in women and often manifests at a young age. It has been proven that patients diagnosed at later stages have a higher risk of developing liver cirrhosis. Therefore, early diagnosis significantly increases treatment effectiveness and improves the likelihood of long-term remission. Although immunosuppressive therapy is effective, long-term treatment is required to prevent disease recurrence. In some patients, intolerance or adverse effects of medications may occur, necessitating the development of individualized treatment strategies. Patients who are diagnosed late or are resistant to standard therapy may develop liver failure, in which case liver transplantation remains the only solution.

Keywords: Autoimmune hepatitis, liver cirrhosis, ALT, AST, IgG, ANA, ASMA, LKM-1.

INTRODUCTION: Autoimmune hepatitis (AIH) is a chronic inflammatory liver disease that develops as a result of dysfunction in the body's own defense mechanisms (the immune system). The underlying process involves the immune cells attacking hepatocytes — the main functional units of the liver. The term "autoimmune hepatitis" comes from the Greek word "Auto" meaning "self," "Immun" referring to the body's defense system, and "Hepatitis" meaning inflammation of the liver parenchyma. Thus, autoimmune hepatitis can be defined as "an inflammatory process in the liver tissue caused by the activity of the body's own immune cells."Research on this disease began in the mid-20th century. In 1956, the Swedish researcher Waldenström was the first to scientifically describe the condition and named it "Lupoid Hepatitis." This terminology was based on the detection of specific serological markers such as ANA (antinuclear antibodies) in the serum of affected patients, which resembled those found in systemic autoimmune diseases — particularly systemic lupus erythematosus (SLE). In subsequent decades, extensive research revealed the unique immunopathogenetic mechanisms of the disease and established its status as an independent nosological entity. Consequently, the disease was renamed Autoimmune Hepatitis (AIH).

Clinical Course and Serious Complications: If autoimmune hepatitis is not diagnosed in time and appropriate treatment measures are not taken, it can lead to severe complications. The progressive nature of the disease results in liver fibrosis, and in advanced stages, liver cirrhosis and acute liver failure may develop. These complications significantly impair the patient's quality of life and may necessitate liver transplantation.

Epidemiology and Clinical Manifestations: Epidemiological data indicate that AIH occurs more frequently among young and middle-aged women, though the disease can develop in individuals of any age or gender. Therefore, autoimmune hepatitis is not limited by age or sex boundaries.

Diagnostic Challenges: Autoimmune hepatitis often presents with nonspecific symptoms such as fatigue, pain in the right upper quadrant, or jaundice. These manifestations are common to many other liver diseases, which makes early detection and diagnosis of AIH difficult.

Characteristic Features of Autoimmune Hepatitis: Autoimmune hepatitis has three key defining features that determine its pathogenesis and clinical significance:

- Autoimmune nature: The immune system loses tolerance and attacks the body's own liver cells, recognizing them as "foreign."
- Chronic course: The disease progresses slowly over months or years.
- Progressive character: Without treatment, the condition gradually worsens, leading to liver failure or cirrhosis.

In recent years, the incidence of autoimmune hepatitis has been increasing worldwide, emphasizing the importance of early diagnosis and effective management strategies.

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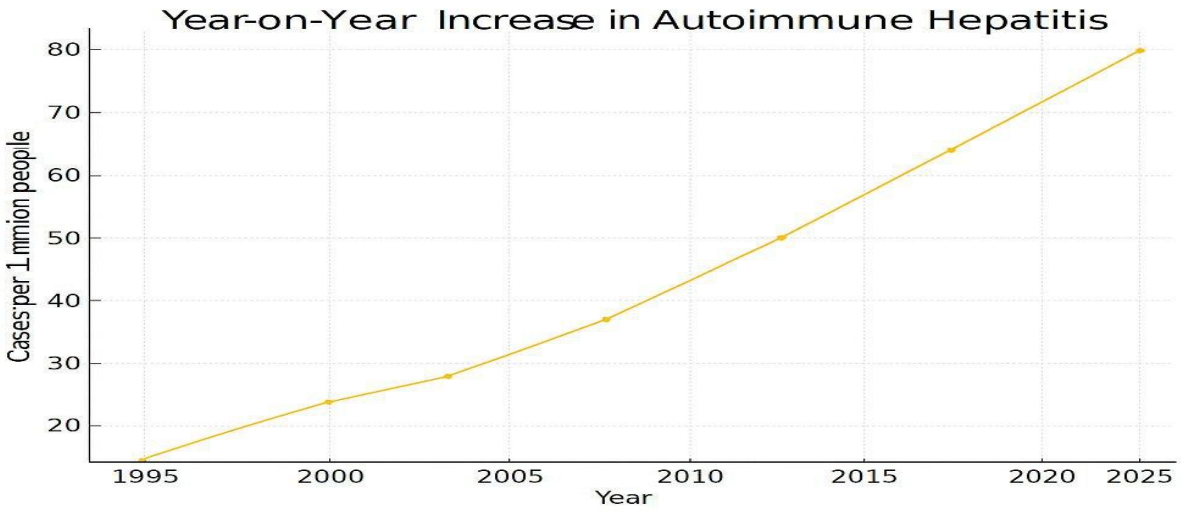

Although autoimmune hepatitis is a relatively rare disease, its incidence has been steadily increasing worldwide over the past 20–25 years. According to statistical data, the number of patients per 1 million population was 10 in 1995, 20 in 2000, 25 in 2005, 35 in 2010, 50 in 2015, 65 in 2020, and is projected to reach 80 by 2025. The disease occurs 4–6 times more frequently in women than in men. Overall, 70–80% of all autoimmune diseases are reported in women. This phenomenon is believed to be associated with hormonal factors, particularly the influence of estrogen on immune system activity.Although the incidence of autoimmune hepatitis is influenced by hormonal factors such as the effect of estrogen on immune system activity, improvements in diagnostic techniques and increased awareness of the disease have also led to the identification of more cases. Nevertheless, in some regions, standardized diagnostic criteria and specialized treatment options remain insufficiently developed.Due to the epidemiological trends mentioned above and the poor prognosis of the disease, the comprehensive study of the clinical features, modern diagnostic methods, and treatment outcomes of autoimmune hepatitis remains one of the most pressing issues in contemporary hepatology. The incidence of this disease continues to rise worldwide, including in the Republic of Uzbekistan.Because the liver plays a vital role in maintaining the body's overall physiological balance, its inflammation can lead to dysfunction across nearly all body systems.

Latent Course of the Disease: In many cases, autoimmune hepatitis progresses silently. Patients initially experience only mild, nonspecific symptoms such as fatigue, weakness, or slight jaundice, which can create a false impression of good health. As a result, severe complications may develop over time.

Importance of Early Detection: Through early diagnosis and adequate immunosuppressive therapy, remission can be achieved in 80–90% of patients, allowing them to live a full and active life. This underscores the clinical and social importance of recognizing and treating autoimmune hepatitis in its early stages.

Aim of the Study: The objective of this study is to develop reliable diagnostic criteria for the early detection of autoimmune hepatitis. To achieve this, the diagnostic significance of laboratory parameters such as ALT, AST, IgG, and autoantibodies (ANA, ASMA, LKM-1) will be evaluated. The study focuses particularly on determining which markers play a crucial role in the accurate and early identification of the disease. Additionally, the relationship between clinical manifestations of autoimmune hepatitis and laboratory findings will be analyzed.

MATERIALS AND METHODS: Laboratory testing plays a central role in the diagnosis of autoimmune

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hepatitis. This study primarily employs biochemical and immunological methods.

- Biochemical Tests:These tests help assess the extent of liver cell damage and the functional state of the liver.
- ALT (Alanine aminotransferase) and AST (Aspartate aminotransferase) are enzymes released into the bloodstream when hepatocytes are damaged, and their elevation is one of the main indicators of hepatocellular injury.
- ALP (Alkaline phosphatase) assists in identifying liver and biliary tract disorders.
- Bilirubin (total and conjugated) — is used to assess the detoxification function of the liver; its elevation may indicate jaundice or liver failure.

2. Immunological tests:In identifying the immune mechanisms of autoimmune hepatitis, testing for autoantibodies is of great importance.

- Antinuclear antibody (ANA) — indicates that the inflammatory process is of autoimmune nature.
- Smooth muscle antibodies (SMA) — signify the presence of antibodies directed against liver and smooth muscle tissues.
- Liver–kidney microsomal antibodies (LKM-1) — are mainly associated with type 1 autoimmune hepatitis and are important for differential diagnosis.
- Soluble liver antigen/pancreas antigen antibodies (SLA/LP) — are highly specific for autoimmune hepatitis and play a crucial role in confirming the diagnosis.

3. Immunoglobulins**:**

- The IgG level is elevated in autoimmune hepatitis and is evaluated as an indicator of immune system activity.

RESULTS AND ANALYSIS: According to the study findings, approximately 80% of patients with autoimmune hepatitis showed alanine aminotransferase (ALT) and aspartate aminotransferase (AST) levels that were 4–5 times higher than normal. This indicates that liver cells are actively involved in the inflammatory process. In addition, about 85% of patients were found to have autoantibodies such as antinuclear antibodies (ANA) or smooth muscle antibodies (SMA). These results confirm the autoimmune nature of the disease and the immune system's reaction against liver tissue.Liver biopsy (histological analysis) revealed periportal inflammation and varying degrees of fibrosis in about 65% of patients, which are characteristic morphological features of autoimmune hepatitis.Treatment outcomes showed that immunosuppressive therapy led to clinical and laboratory improvement in 75–82% of patients. Moreover, in cases where the disease was diagnosed early, the effectiveness of treatment was higher, and the likelihood of remission (disappearance of disease symptoms) increased.However, in patients with late diagnosis, the risk of developing irreversible cirrhotic changes in liver tissue was found to be high. Some patients also experienced drug intolerance or adverse effects, indicating the need for an individualized treatment approach.Observations show that autoimmune hepatitis occurs more frequently in women, particularly among young and middle-aged patients. Early detection, accurate diagnosis, and timely initiation of immunosuppressive therapy significantly improve the patient's prognosis.The standard treatment regimen consists of a combination of corticosteroids and azathioprine, which is effective in most cases. However, to prevent disease relapse, long-term therapy is recommended.Long-term therapy is recommended. If the disease does not respond to treatment or is detected at a late stage, liver failure may develop. In such cases, liver transplantation is considered the definitive treatment option. The obtained results confirm that the comprehensive evaluation of clinical signs, laboratory tests, and histological data plays a crucial role in the accurate diagnosis and effective management of autoimmune hepatitis.

- In conclusion, although autoimmune hepatitis (AIH) is a serious pathology, it is a manageable disease when diagnosed early.
- -Diagnostic approach:A definitive diagnosis of AIH cannot rely on a single criterion. The diagnostic process must be based on a combined assessment of clinical manifestations, autoantibody testing (serology), and liver biopsy (histology) findings.
- -Therapeutic effectiveness:Immunosuppressive therapy remains the cornerstone of AIH treatment. This therapeutic approach plays a decisive role in achieving stable and long-term remission in most patients.
- -Long-term management:Due to the high risk of relapse, continuous medical supervision is essential. Regular monitoring is critical for preventing disease recurrence and for the early detection of possible complications.

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