MORPHOMETRIC CHARACTERISTICS OF THE LIVER DURING PREGNANCY IN EXPERIMENTAL CHRONIC RENAL FAILURE

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Abstract. *The treatment of liver pathologies in chronic renal failure observed during pregnancy and the prevention of their consequences remains a medical and social problem worldwide. Despite the development of methods for the prevention, diagnosis and treatment of liver diseases, mortality rates from them occupy leading places. Currently, in our country, special attention is paid to improving the quality of social protection and the health care system, diagnosis and treatment of chronic liver diseases. We studied the morphological and morphometric parameters of the liver of pregnant white rats. The main purpose of the study of post-chronic kidney disease changes in morphological and morphometric indicators of the liver of white-breed fetal rats.*

Keywords: *Diagnosis and treatment of chronic liver diseases, prevention of liver diseases, morphological parameters, morphometric parameters.*

Introduction. Liver diseases remain a major challenge in global health, with their diverse nature and frequent comorbidities making it difficult to understand their underlying mechanisms and provide optimal treatment. Metabolomics, which involves the quantitative analysis of small organic molecules (metabolites) in biological samples, is becoming increasingly significant in liver disease research. However, carrying out a metabolomics study in human liver disease populations demands a deep understanding of several critical steps: designing the study, collecting samples, acquiring and preprocessing metabolomics data, performing statistical and bioinformatics analysis, and interpreting the results within a biomedical framework [1,2].

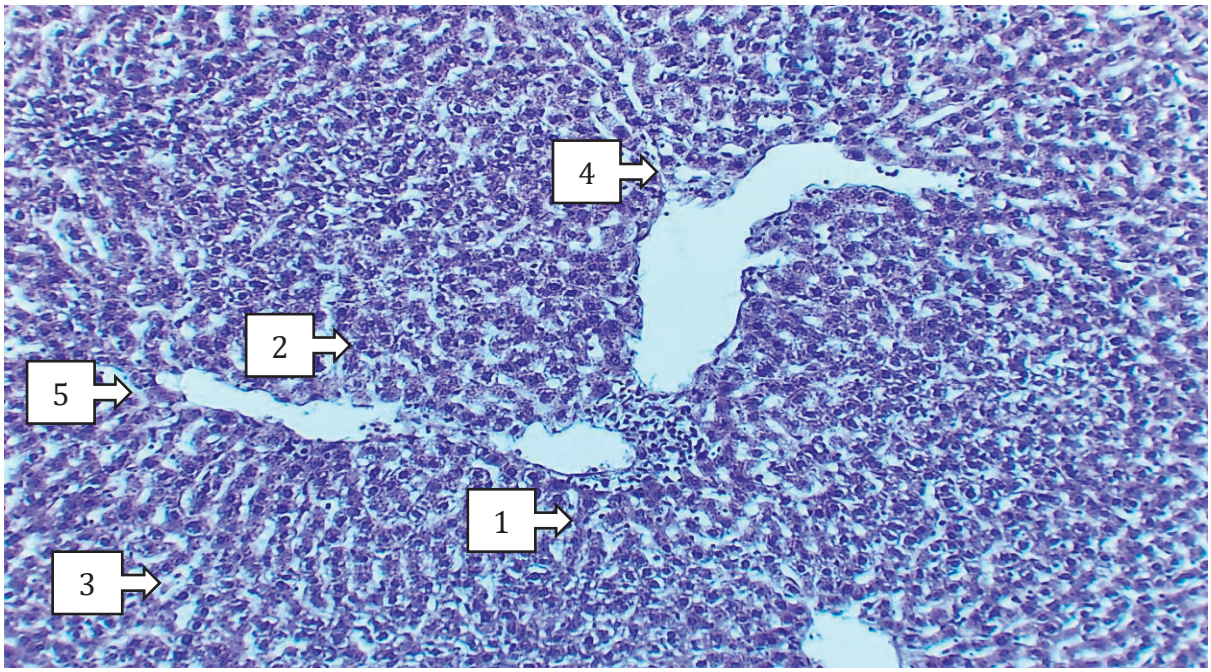
Liver disease during pregnancy is one of the least researched areas in obstetrics, posing significant challenges for both gynecologists and hepatologists. Around 3% of pregnant women experience some form of liver disorder, some of which can be life-threatening for both the mother and the fetus. These conditions can be categorized into three distinct types: One type is liver diseases directly linked to pregnancy, which arise at specific gestational stages; Second type is liver conditions unrelated to pregnancy, such as viral or drug-induced hepatitis, which can occur at any time; and Another type pregnancies in women who already have pre-existing liver disease. Clinicians must be well-versed in these disorders to ensure timely and appropriate management, particularly in urgent cases where emergency delivery cannot be delayed [3,5].

The study of morphological and morphometric indicators of the liver disease in the context of fetal and maturational diseases makes it possible to improve the methods of diagnosis and treatment of yanchi in clinical practice. New research in this area is necessary, especially through these methods, it is possible to understand the main mechanisms of the development of mattresses and develop new treatment strategies.

Clinical routine in liver disease involves the diagnosis and treatment of a wide spectrum of metabolic, infectious, autoimmune and neoplastic diseases. Clinicians integrate qualitative and quantitative information from multiple data sources to make a diagnosis, prognosticate the disease course, and recommend a treatment. Our scientific innovation is to prevent the development of liver diseases in chronic kidney diseases. Further advances in research and medical care have improved maternal and fetal outcomes, but are still not satisfactory. In this review, we present an overview of liver diseases characteristic of a pregnant woman and updates on their pathogenesis, treatment and results [4,6].

Material and methods of research. A study examined chronic maturation failure using 150 white rats, with liver tissue analyzed histologically after one month. The microscopic evaluation focused on the liver cell structure of fetal-stage rats. The research was conducted at the Bukhara branch of the Bukhara State Medical Institute and the Republican Specialized Scientific and Practical Medical Center for Maternal and Child Health. Statistical analysis was performed using Fisher's exact test or the Student's t-test, as appropriate.

Results and discussion. Hepatocytes in the periportal (afferent) and perivenous (efferent) zones of the liver parenchyma differ in their enzymatic composition and subcellular structures. Therefore, different functions are offered for the two zones. (a) protection against oxidative energy metabolism, beta-oxidation, catabolism of amino acids, ureagenesis from amino acids, gluconeogenesis, separation and oxidation of acetic acid and bilirubin is preferably located in the periportal zone. b) glycolysis, liponeogenesis, ureagenesis from ammonia and biotransformation are mainly located in the perivenous zone. Heterogeneity also appears to be present in plasma protein synthesis [7].



1-pic. Morphological structure of liver tissue. Paint G-E. 10x10

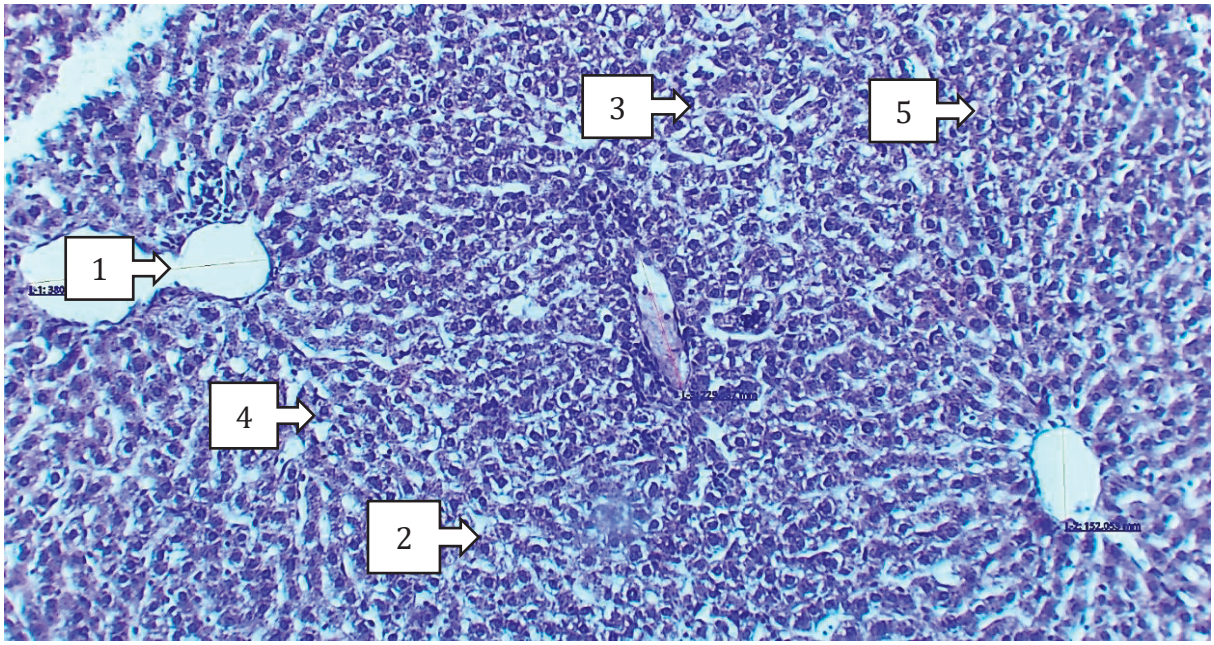
1. Deformation of the central vein wall (sclerotic changes), fullness and narrowing of the cavity,inflammatory infiltrate around.

2. Perenchymatous protein (hydropic and hyaline droplet) dystrophy in hepatocytes. hepatocytes-the nucleus is painted with a reduced basafil in the center, the cytoplasm of which is occupied by vacuoles (droplets) of different sizes).

3. Fatty (fat drops) dystrophy in hepatocytes.

4. The cavity of the Sinusoid cavity and perisinusoid area (Disse) is enlarged swelling.

5. The number of dual-core hepatocytes has decreased.



2-pic. Morphometry of liver tissue. Paint G-E. 10x10

1. Deformation of the central vein wall (sclerotic changes), fullness and narrowing of the cavity (in dimensions), around inflammatory infiltrate.

2. Perenchymatous protein (hydropic and hyaline droplet) dystrophy in hepatocytes. hepatocytes-the nucleus is painted with a reduced basafil in the center, the cytoplasm of which is occupied by vacuoles (droplets) of different sizes).

3. Fatty (fat drops) dystrophy in hepatocytes.

4. The cavity of the Sinusoid cavity and perisinusoid area (Disse) is enlarged swelling.

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After experimental kidney failure, microromorphometric indicators of the liver of pregnant white-breed rats were found, and the following results were recorded: the size of hepatocytes from 1 mm2-3 to 1 mm2-7 on average 1 mm2-5; the size of their nuclei from 1 mm2-4 to 1 mm2-6 on average 1 mm2-5; sinusoid width from 10 µm to 20 µm on average 15 µm; cytoplasm size 325mkm3; the number of mitochondria in 1 hepatocyte -150 to -350 on average 1 hepatocyte-250; the hepatic artery size ranged from 60 µm to 160 µm with an average of 110 µm; the portal vein diameter ranged from 120 µm to 320 µm with an average of 220 µm; biliary capillaries ranged from 15 µm to 35 µm in diameter with an average of 25 µm.

It was found that the wall of the middle and small-caliber arteries thickened, and narrowing of the blood flow path led to secondary hypertension and atrophy of the renal parenchyma. Rats in the same group studied the anatomical and morphological changes that occur in the liver during pregnancy. When the liver is macroscopic, the size is enlarged, the surface is smooth, the capsule is reminiscent of tense nutmeg. When examined microscopically: deformation of the central venous wall (sclerotic changes), fullness and narrowing of the cavity (in dimensions), inflammatory infiltrate around. Perenchymatous protein (hydropic and hyaline droplet) dystrophy in hepatocytes. Hepatocytes-the nucleus is painted with a reduced basaphil in the center, the cytoplasm of which is occupied by vacuoles (droplets) of different sizes. We can see that the uneven fat(drops) of hepatocytes located at the edges of the liver fragments press - fatty dystrophy has developed.The cavity of the Sinusoid cavity and perisinusoid area (Disse() is enlarged,swelling.metabolism is evident in the fact that processes are slow, while the numerical increase in bi-nuclear hepatocytes is evident in the decompensation process.

Conclusion. The experimental group exhibited significant ultrastructural changes in rat liver cells, including the disappearance of intramitochondrial granules in the mitochondrial matrix, dilation of the endoplasmic reticulum cisternae with small vesicle formation, and a reduction in ribosome numbers. Additionally, alterations in the microcirculatory system were observed, such as swelling of interlobular artery walls with lymphoid cell infiltration. The arterial wall thickness increased significantly—3.8 times higher than normal—reaching 7.39 ± 0.3 μm ($p < 0.001$). The most pronounced changes occurred in the venous structures, where portal venules in the experimental group dilated drastically, reaching a maximum diameter of 90.67 ± 5.6 μm ($p < 0.001$). Sinusoids also underwent notable transformations, with hypertrophied hepatocytes compressing them and reducing their volumetric density (Vvr) by 11-fold (1.6 ± 0.01%, $p < 0.001$). In some regions, sinusoids were dilated and congested with erythrocytes, while sinusoidal cells exhibited swelling.

In pregnant rats with induced renal failure, morphological alterations were also detected in the bile duct capillaries. Hepatocytes showed a decline in mitochondrial numbers, endoplasmic reticulum cisternae, and glycogen granules, indicating impaired synthetic function. These changes further affected bile duct integrity, leading to partial emptying of interlobular bile ducts and wall deformation. Compression of the ducts caused luminal distension, and the average diameter of interlobular bile ducts decreased from 33.32 to 30.14 ± 0.82 μm ($p < 0.001$).

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