LIVER MORPHOMETRIC CHANGES DURING FETAL DEVELOPMENT IN EXPERIMENTAL KIDNEY DISEASE: A COMPARATIVE ANALYSIS

Rakhmankulova N.G.
Bukhara State Medical Institute named after Abu Ali Ibn Sino (Bukhara, Uzbekistan)
raxmonqulova.nargiza@bsmi.uz

Abstract. *For the first time, a systematic investigation was conducted on white fetal rats with experimentally induced chronic kidney disease (CKD) to assess morphological changes in different regions of liver tissue. The study evaluated the effects of Juizar water treatment by analyzing morphometric parameters of the liver to determine its therapeutic efficacy. Additionally, the research aimed to establish early diagnostic criteria for liver cell damage based on experimental findings. The results were used to develop examination protocols for treating women with CKD, with a focus on predicting and preventing liver complications. Further studies were conducted to prepare reproductive age women particularly pregnant women for healthy fetal development by enabling early detection and prevention of liver cell damage. In Uzbekistan, work is carried out to improve the social protection of the population and the quality of medical services. Steps are taken towards the elimination of chronic liver diseases, prevention of their consequences, as well as the introduction of early diagnosis and effective treatment methods. In this regard, it is important to improve the skills of medical personnel, introduce modern diagnostic tools and provide the population with the right health information. In the Prevention of liver diseases, the formation of the right lifestyle and regular medical examinations are central. The reforms carried out in this way in our country serve to improve the quality of prevention and treatment of diseases.*

Keywords: *Chronic kidney disease, prevention of liver diseases, biochemical parameters, diagnostic criteria.*

Introduction A study investigated the effects of administering high doses of zidovudine, lamivudine, and ritonavir to pregnant rats, revealing structural and dimensional alterations in the maternal liver and kidneys. However, no such changes were observed in the fetal organs. *(Morphological and morphometric analysis of the liver and kidneys of pregnant rats and their fetuses treated with zidovudine, lamivudine, and ritonavir throughout pregnancy.* Physiological changes that occur in the body during pregnancy, especially their impact on liver and kidney functions, occupy a significant place in the field of Medicine. In fetuses with chronic maturation diseases, it is necessary to identify changes in the morphological and morphometric indicators of these organs, better understand clinical results and develop the right methods of treatment [1,5].

Another study found a strong link between a high-fat diet in white rats and kidney damage, including reduced glomerular density, structural abnormalities, enlarged renal vessels and tubules, glomerular necrosis and atrophy, and thickening of the basement membrane.Embryonic cell injection offers an efficient method for promoting epithelial differentiation and tubule formation, facilitating key developmental processes such as complex structure formation and basement membrane assembly. Additionally, grafting techniques enable research into embryonic kidney vascularization and the influence of endothelial cells on developing embryonic cells. [6,7].

The study of morphological and morphometric indicators of the liver and kidneys 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.

Additional studies have investigated the impact of experimentally induced kidney disease on fetal liver development. Through a comparative assessment, researchers analyzed morphometric alterations in the liver, assessing possible changes in its architecture and dimensions in fetuses with impaired kidney function. These results enhance our knowledge of the relationship between kidney dysfunction and liver maturation during gestation, offering valuable perspectives on interorgan interactions in fetal development and disease. [2,4].**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.**

Material and methods of research. A study involving 150 white rats modeled chronic maturation failure, followed by histological examination of liver tissue after one month. Microscopic analysis was conducted on the liver cell structure of fetal-stage rats. The research was carried out at the Bukhara branch of the Bukhara State Medical Institute and the Republican Specialized Scientific and Practical Medical Center for Maternal and Child Health, with statistical analysis performed using Fisher's exact test (or Student's t-test, depending on the context).

Results and discussion. The embryology, morphology and histology of the normal human liver - the only largest organ in the human body - are described. It has been argued that liver biopsy samples must be processed with special care to obtain optimal sections. Morphological studies of liver tissue have the potential to obtain more information than electron microscopy. Some histological changes may be noticeable in surgical liver samples, but they are often insignificant. On the other hand, some morphological changes, especially in needle biopsy samples, are often subtle but may have diagnostic significance.

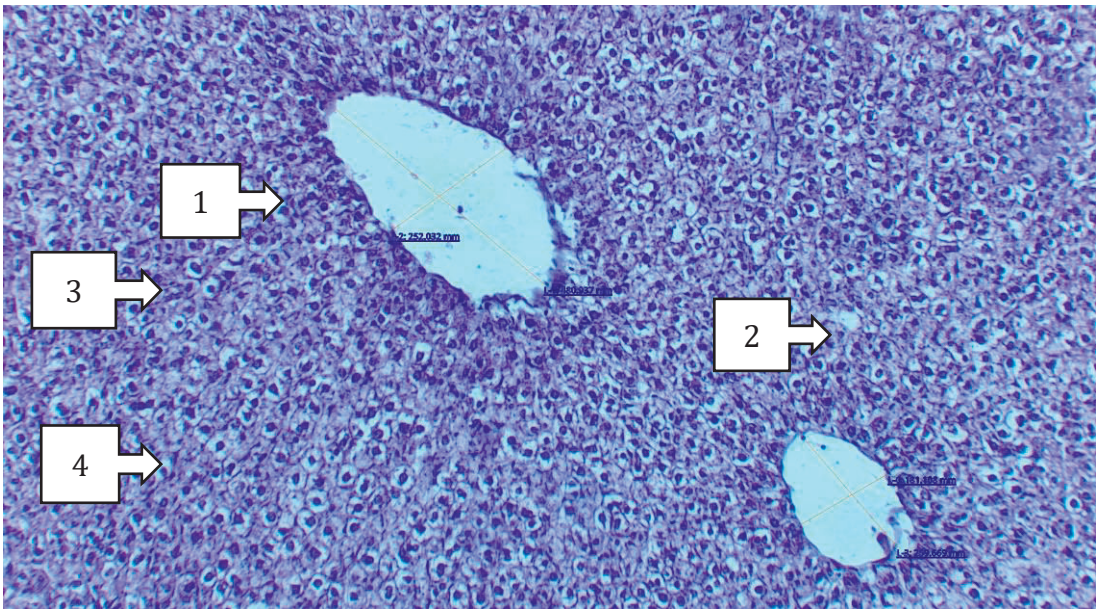

Fig. 1. Morphometry structure of liver tissue. Paint G-E. size 10x10

1.Deformation and cavity of the central vein wall in dimensions.

2. Small volumetric vacuoles (droplets. the nucleus of hepatocytes is in the center, basaphilically painted.

3. The sinusoid space and the pericinusoid area (Disse) space are narrowed.

4. The Kupfer cell and the bi-nuclear hepatocytes are numerically abundant.

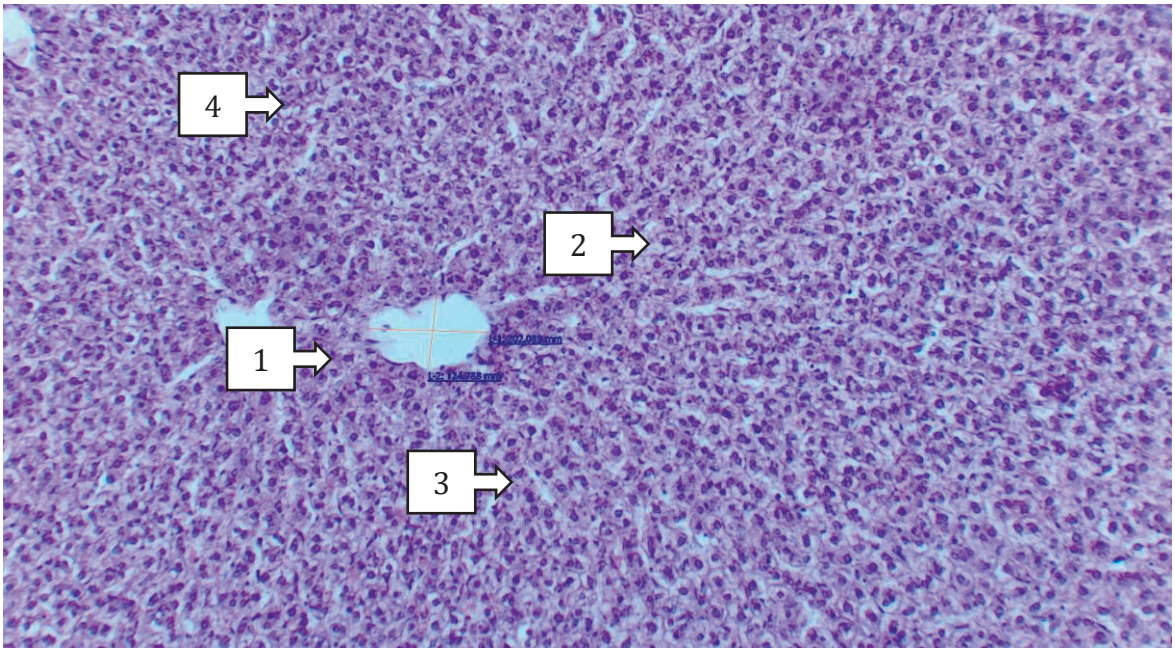

Fig. 2. Morphometry of liver tissue. Paint G-E. paint 10x10.

1.Deformation and cavity of the central vein wall in dimensions.
2.Small volumetric vacuoles (droplets. hepatocytes-the nucleus is in the center, basafil painted.
3.The sinusoid space and the pericinusoid area (Disse) space are narrowed.
4.The Kupfer cell and the bi-nuclear hepatocytes are numerically abundant.

The study investigated morphological and functional changes in hepatocytes of the liver in conditions of chronic maturation failure, as well as the pathogenetic mechanisms that affect them. The results show that kidney dysfunction has a very strong effect on the structure of the liver, leading to metabolic and structural disorders in it. These assignments not only made it possible to more deeply understand the physiology of the digestive system, but also helped to understand the complex organ-aralic interactions that arise during pregnancy [1,3].

Morphometric indicators of the liver of healthy white-breed rats (M±m)

Histological indicators	Min	Max	Avarage
Hepatocyte	1 mm²-3	1 mm²-7	1 mm²-7
Nucleus	1 mm²-4	1 mm²-8	1 mm²-6
Sinusoid width	5mkm	15mkm	10mkmv
Cytoplasm size	average for each cell-210mkm3	average for each cell-650mkm3	average for each cell-420mkm3
Number of mitochondria	1 hepatocyte-100	1 hepatocyte-300	1 hepatocyte-200
Blood vessel diameter			
Hepatic artery	50mkm	150mkm	100mkm
Portal vein diameter	100mkm	300mkm	200mkm
Biliar capillaries	10mkm	30mkm	20mkm

Conclusion. The study investigated morphological and functional changes in hepatocytes of the liver in conditions of chronic maturation failure, as well as the pathogenetic mechanisms that affect them. The results show that kidney dysfunction has a very strong effect on the structure of the liver, leading to metabolic and structural disorders in it. These assignments not only made it possible

to more deeply understand the physiology of the digestive system, but also helped to understand the complex organ-aralic interactions that arise during pregnancy.

When morphometric indicators of the liver of healthy white-breed rats were studied, the following results were obtained: the size of hepatocytes ranges from 1 mm2-3 to 1 mm2-7 on average 1 mm2-7; the size of the nuclei ranges from 1 mm2-4 to 1 mm2-8 on average 1 mm2-6; the width of the sinusoids ranges from 5mkm to 15mkm on average 10mkmv; the size of the cytoplasm averages-210mkm3 to-650mkm3 on average-420mkmkm3; the number of mitochondria -300 to 1 hepatocyte-200 on average; hepatic artery size ranges from 50 µm to 150 µm on average 100 µm; portal vein diameter ranges from 100 µm to 300 µm on average 200 µm; biliary capillaries ranged in diameter from 10 µm to 30 µm, averaging 20 µm.

Hepatocytes are the main cell of the liver. The structure of the hepatocyte cell is cuboid or polygonal. The nucleus is in the center of the cell, round in shape-in most cases it is bicellular. The cytoplasm is stained eosinophilic. In its cytoplasm, it is rich in an endoplasmic lattice (organelle synthesizing blood plasma proteins) and a large amount of granular endoplasmic lattice (organelle synthesizing toxins, bilirubin and bile fluid). In hepatocytes, the following surfaces are differentiated. Sinusoidal surface of hepatocytes. The Sinusoid has a surface facing the capillaries, carries out the exchange of substances, the synthesis of proteins. Biliary surface-bile fluid synthesis occurs. The apical surfaces of the two adjacent hepatocytes, which have pits on the membrane, fuse to form the wall of the bile duct.

Hepatocytes are surrounded by fine connective-reticulin fibers, forming a stroma. Hepatocytes combine to form the liver plate. The plates also form a cross-anastamosis, between which sinusoid capillaries are located, which are considered branches of the portal vein and hepatic artery. The wall of Sinusoid capillaries will contain Kupfer cells of phenestrated endothelium and star-shaped reticulo-endotheliocytes. The basal membrane consists of incomplete fenesters. Kupfer cells perform the following tasks; phagocytosis of antigens that come through the blood. By breaking down aging erythrocytes, the iron is bound to ferritin protein, stored as a reserve and involved in the formation of erythrocytes at the required time is EET. Between sinusoids and hepatocytes is the pericinusoid space, this space is called the Disse space. In the processes of metabolism, manashu space is the main one. There is another HSC star-shaped cell in the Disse cavity. The function of the HSC cell is to accumulate vitamin A and fat-soluble vitamins. Synthesis of extrasellular matrix i.e. is converted to myofibroblasts in the wound Mahal.Liver slices are the structural functional unit of the liver. In the middle of each blotch is the central vein (Vena centralis). The Sinusoid capillaries and liver plate are radially oriented to the central vein. The liver fragments are separated by Inter-hepatic intercostal connective tissue,and in this area the hepatic triad (artery, vein, and bile ducts) settles.

We studied morphological and morphometric indicators of the liver of pregnant white-breed rats in our experiment. In the central vein, we can see a general venous wave, deformation of the central venous wall as a result of a slowdown in the circulation of venous blood, a fullness with an enlarged cavity. The consequence of this is the expansion of the Sinusoid space, fullness and narrowing of the cavity in the pericinusoid area (Disse). The narrowing of the Disse cavity directly affects the processes of metabolism, slowing down these processes. Processes such as slowing down the exchange of substances in the liver,hypoxia are obvious evidence of uneven thickening of light pink collagen fibers around the central vein.Hypoxia has a direct effect on the functional state of hepatocyte - cell structures. Small volumetric vacuoles(droplets) appeared in the cytoplasm of hepatocytes. This process has led to a mild disruption of the water-electrolyte balance inside and outside the cell. It was found that fluid in the form of vacuole drops passed into the hepatocytes. In this, hepatocytes - the nucleus is in the center, basafil is painted. The cytoplasm is eosinophilic stained, wide in size. The dimming of the blood increases the agglutination of erythrocytes, and this led to an increase in the Kupfer cells (the function of which was described above) in the sinusoid wall. We can see that regenerative regeneration processes are enhanced when the body's capacitor processes are increased and the number of dual-core hepatocytes among hepatocytes increases.

REFERENCES

1. Akhmedov F.K., Negmatullayeva M.N., Tuksanova D.I. Features of kidney function in women with complicated preeclampsia. International Journal of Current Research and Reviews, 2021, 13(1), pp.70-744

2. Lactation amenorrhea as a method of postpartum contraception.K. Jabbarova, N.G.Rakhmankulova.Biology and Integrative Medicine,pp. 54-62

3. Rakhmonkulova Nargiza Gofurovna& Nematilllaeva Mastura Nurullaevna & Tuksanova Dilbar Ismatovna & Kholova Nodira Fazliddinovna & Solieva Nozima Karimovna. (2024). Comparative characterization of liver morphometric parameters during pregnancy in experimental chronic renal failure. BIO Web of Conferences.121.04004.10.1051/bioconf/202412104004. https://www.explorgate.net/publication/382478714

4. Rakhmonkulova Nargiza Gafurova.Ultrasound examination of the restoration of reproductive function in women who underwent cesarean section. International Interdisciplinary Scientific Journal GALAXY, 10 (1),

5. Ochilova D. A., Rakhmonkulova N. G., Sabirov S. H. Features of the course of hypertension in people with dyslipidemia. American Journal of Medicine and Medical Sciences 2020, 10(2):77-80

6. Zaripova D.Ya., Abdullayeva M.A., Sultanova N.A., Akhmedov F.K., Nasirov Z.S., Umarov E.U., Shukrullayeva G.J. Optimization of diagnostic measures for early menopause and premature menopause. The journal "Reproductive Health of Eastern Europe". 2024;14 (5). pp.617-628.

7. Zaripova D.Ya. Diagnostic criteria for the detection of osteoporosis in the perimenopausal period. Productive health of Eastern Europe. 2024;14 (5). pp.590-598. https://doi.org/10.34883 /PI.2024.14.5.004