

## COMPARATIVE MORPHOMETRIC CHARACTERISTICS OF THE LIVER DURING PREGNANCY IN EXPERIMENTAL ACUTE RENAL FAILURE

Rakhmonkulova N G

Bukhara State Medical Institute named after Abu Ali Ibn Sino, Bukhara, Uzbekistan E-mail:  
raxmonqulova.nargiza@bsmi.uz

**Abstract:** Acute kidney disease (AKD) during pregnancy remains a significant medical and social problem, strongly influencing the morphology and function of the liver. This study aimed to evaluate the morphometric and histological changes in the liver of pregnant white rats with experimentally induced chronic renal failure. A total of 60 seven-month-old rats were included in the experimental series. Histological analysis revealed marked alterations in hepatic architecture, including vacuolization of hepatocyte cytoplasm, deformation of the central vein wall, sinusoidal dilation, and increased Kupffer cell activity. These findings provide new insights into the mechanisms underlying hepatic dysfunction in pregnancy complicated by AKD and may contribute to improving early diagnosis and preventive strategies.

**Keywords:** chronic renal failure, pregnancy, liver morphometry, hepatocyte, Kupffer cells.

### INTRODUCTION

Pregnancy is accompanied by profound physiological changes affecting many organ systems, particularly the kidneys and liver. The presence of acute kidney disease (AKD) complicates this physiological adaptation, often leading to severe maternal and fetal complications. Globally, liver pathologies associated with AKD during pregnancy remain among the leading causes of maternal morbidity and mortality

Despite advances in prevention and diagnostics, the mortality associated with liver diseases in pregnancy remains high. Morphometric analysis of the liver offers valuable insights into the structural and functional alterations caused by AKD. In particular, studying experimental models using white rats provides controlled conditions for understanding pathophysiological mechanisms and developing therapeutic interventions. This research addresses the gap in knowledge regarding comparative morphological and morphometric changes of the liver in pregnant rats under conditions of experimentally induced acute renal failure.

**Materials and Methods.** A total of 60 white outbred rats (7 months old) were used in this experimental study. Acute renal failure was induced through established experimental protocols one month before pregnancy. The animals were divided into control and experimental groups. Histological examination was performed using liver tissue samples fixed in formalin, embedded in paraffin, and stained with hematoxylin–eosin and Van



Gieson methods. Morphometric analysis was carried out using an ocular micrometer (DN-107T, Novel, China). Parameters measured included hepatocyte size, nuclear diameter, sinusoidal spaces, portal triad dimensions, and Kupffer cell counts.

**Results.** Histological evaluation revealed distinct alterations in liver morphology following experimental acute renal failure in pregnant rats: Central vein changes: deformation and narrowing of the central vein walls were frequently observed. Hepatocyte cytoplasm: vacuolization and signs of protein (hydropic and hyaline-droplet) dystrophy were present. Kupffer cells: a significant increase in the number of Kupffer cells indicated ongoing inflammatory and regenerative processes. Binucleated hepatocytes: their number increased, reflecting compensatory and regenerative activity. Sinusoidal spaces: dilation and irregular expansion of Disse's space were documented, suggesting microcirculatory disturbances. Quantitative morphometric analysis demonstrated enlargement of hepatocyte diameters and nuclei, with statistically significant differences compared to controls ( $p < 0.01$ ).

**Discussion.** The findings demonstrate that pregnancy complicated by AKD leads to profound liver remodeling. Vacuolization of hepatocytes and central vein deformation are structural correlates of metabolic stress and impaired hemodynamics. The increase in Kupffer cells and binucleated hepatocytes indicates activation of compensatory mechanisms to maintain hepatic function.

These data correspond with previously published observations (Rakhmonkulova et al., 2024; Altunkaynak, 2020), confirming that AKD accelerates degenerative and regenerative processes in the liver. Moreover, morphometric changes in hepatocytes and portal triads emphasize the importance of early diagnostic approaches for pregnant women with renal pathology.

Preventive measures, including adequate fluid balance and therapeutic interventions, could mitigate these hepatic alterations. The study also suggests potential value in exploring mineral water therapy (e.g., Jo'yzar water), rich in trace elements, for supportive management in such conditions.

**Conclusion.** This experimental study highlights that acute renal failure during pregnancy significantly affects liver morphology and morphometry. Key findings include hepatocyte vacuolization, sinusoidal dilation, Kupffer cell proliferation, and central vein wall deformation. These alterations reflect the complex interplay between renal dysfunction and hepatic adaptation during pregnancy. The results may provide a basis for improved diagnostic criteria, preventive strategies, and therapeutic interventions aimed at reducing complications in pregnant patients with AKD.

