ANATOMICAL DEVELOPMENTAL FEATURES OF OFFSPRING KIDNEYS UNDER THE INFLUENCE OF CHRONIC MATERNAL INTOXICATION.

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Annotation.
This article examines the anatomical developmental features of the offspring’s kidneys under the influence of chronic maternal intoxication. Prolonged exposure of the maternal organism to toxic factors during pregnancy may adversely affect the formation and differentiation of fetal organs, particularly the kidneys. The study analyzes both macroanatomical and microanatomical parameters of the offspring’s kidneys, including kidney size and weight, the ratio of cortical and medullary layers, the degree of nephron development, and the structural characteristics of tissue components.
The findings indicate that under conditions of chronic maternal intoxication, delayed anatomical development, structural alterations, and decreased morphometric parameters may be observed in the offspring’s kidneys. The results of this study are important for assessing the impact of harmful prenatal factors and for the early detection of anatomical changes in renal development.

Introduction.
The kidneys are among the vital organs responsible for maintaining water–electrolyte balance, acid–base homeostasis, elimination of metabolic waste products, and hemodynamic stability in the body. Their normal anatomical development occurs through complex stages during the embryonic and fetal periods. The process of renal ontogenesis originates from the mesoderm and proceeds through the stages of pronephros, mesonephros, and metanephros, with the permanent kidney ultimately developing from the metanephros. Any disruption in this process may lead to alterations in both the macrostructure and microstructure of the organ.
In recent years, environmental factors, industrial waste, heavy metal salts, medications, and other toxic substances have become widespread contributors to chronic exposure in humans. Chronic maternal intoxication during pregnancy, in particular, may

adversely affect the formation and differentiation of fetal organs. This condition can lead to various anatomical and morphological alterations in the offspring.

During embryonic development, the kidneys demonstrate high sensitivity to toxic influences. Exposure to harmful factors may result in a reduced number of nephrons, altered cortical and medullary layer ratios, and insufficient formation of glomerular structures. Therefore, studying the anatomical developmental features of offspring kidneys under conditions of chronic maternal intoxication represents a relevant and significant scientific issue.

The aim of this study is to determine the macroanatomical and microanatomical developmental characteristics of the offspring's kidneys under the influence of chronic maternal intoxication and to provide a scientific analysis of the observed structural changes.

Main Part.

1. Normal Anatomical Development of the Kidneys.

Embryonic development of the kidneys begins from the intermediate mesoderm and proceeds through three stages: pronephros, mesonephros, and metanephros. The pronephros is a rudimentary structure that rapidly regresses. The mesonephros functions temporarily as an excretory organ. The permanent kidney, the metanephros, begins to form during the 5th–7th weeks of embryonic development as a result of reciprocal inductive interactions between the metanephric blastema and the ureteric bud.

Normal renal development involves nephron formation (nephrogenesis), differentiation of cortical and medullary layers, and proper development of the vascular system. By the time of birth, the major structural components are formed; however, nephron maturation continues during the postnatal period.

2. Effects of Chronic Intoxication on Embryonic Development.

Chronic maternal intoxication affects the fetal organism through the placenta. Toxic substances may suppress cellular proliferation and differentiation, leading to structural abnormalities during organogenesis. Due to their high metabolic activity during development, the kidneys are particularly sensitive to harmful factors.

Toxic exposure may slow the growth of the metanephric blastema and reduce branching of the ureteric bud, resulting in a decreased number of nephrons. Consequently, this may lead to reduced kidney size and weight.

3. Anatomical Changes Observed in the Offspring's Kidneys.

In offspring born under conditions of chronic intoxication, the following anatomical features may be identified:Decreased macroscopic kidney dimensions (renal hypotrophy);

- Reduced thickness of the cortical layer;
- Incomplete development of medullary structures;
- Decreased nephron number;
- Reduced glomerular size and underdeveloped capillary networks;
- Relative increase in interstitial tissue.

At the microanatomical level, delayed differentiation of tubular epithelial cells, alterations in basement membrane thickness, and increased stromal elements may also be observed.

4. Analysis of Morphometric Parameters.

Anatomical studies typically measure kidney length, width, thickness, mass, and the cortex-to-medulla ratio. Under conditions of chronic intoxication, these parameters are often reduced. Additionally, morphometric indicators such as glomerular diameter, glomerular density, and total nephron count may also decrease.

These changes indicate structural immaturity of the kidneys and may predispose the offspring to functional impairments later in life.

Conclusion.

Chronic maternal intoxication may significantly affect fetal development, particularly the anatomical formation of the kidneys. Renal development during the embryonic period involves complex and delicate stages, and exposure to toxic factors during this time may disrupt nephron formation, cortical and medullary layer development, and vascularization processes.

The findings of the study indicate that offspring born under conditions of chronic intoxication exhibit structural alterations at both macroanatomical and microanatomical levels. Specifically, reduced kidney size, decreased cortical thickness, a lower number of nephrons, and insufficient development of glomerular structures may be observed. These anatomical changes may subsequently predispose individuals to functional impairments.

Therefore, protecting pregnant women from harmful chemical exposures and ensuring environmental and occupational safety measures are of great importance. Early detection of anatomical alterations in prenatal kidney development has significant scientific and practical value in preventing potential pathological conditions in the future.

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