



MORPHOLOGICAL CHANGES IN THE EPIDIDYMIS UNDER THE CONSUMPTION OF WATER WITH DIFFERENT CHEMICAL COMPOSITION

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Abstract: *This article presents an experimental analysis of morphological changes in the epididymis under the long-term consumption of drinking water with different chemical compositions. Special attention was paid to the structural state of the epididymal duct, epithelial height, lumen content, interstitial tissue, and vascular components. Histological examination revealed that the intake of highly mineralized water caused degenerative alterations in epithelial cells, a decrease in stereocilia integrity, interstitial edema, vascular congestion, and a reduction in spermatozoa concentration within the lumen of the ducts. These changes indicate impaired transport, maturation, and storage functions of the epididymis. The findings confirm that the chemical composition of drinking water is an important environmental factor affecting the morphofunctional state of the male reproductive system.*

Keywords: *epididymis, morphology, histology, mineralized water, epithelial degeneration, interstitial tissue, male reproductive system, environmental factors.*

Main part

Introduction

In recent years, increasing attention has been paid to the influence of environmental factors on reproductive health. One of the most significant components of the environment is drinking water, whose chemical composition can vary considerably depending on the region. Elevated levels of mineral salts, heavy metals, and other chemical elements may lead to structural and functional disturbances in various organs and tissues.



The epididymis plays a crucial role in sperm maturation, concentration, storage, and transport. Any structural alteration in its duct system or epithelial lining can negatively affect male fertility. Therefore, studying the morphological changes in the epididymis under the influence of water with different chemical compositions is of great scientific and practical importance.

Materials and methods

The study was carried out on experimental laboratory animals divided into control and experimental groups.

- The control group received drinking water with a physiologically optimal mineral composition.
- The experimental groups consumed water with increased mineralization and altered chemical content for a prolonged period.

After the experimental period, epididymal tissue samples were collected and processed using standard histological techniques. The sections were stained with hematoxylin and eosin and examined under a light microscope.

The following parameters were assessed:

- diameter of the epididymal ducts;
- epithelial cell height;
- integrity of stereocilia;
- degree of lumen filling with spermatozoa;
- condition of interstitial tissue;
- vascular changes.

Statistical analysis was performed using variation statistics with significance levels set at $p < 0.05$.

Results and discussion

In the control group, the epididymis demonstrated normal histological architecture. The duct system was lined by pseudostratified columnar epithelium with well-developed stereocilia. The lumen was densely filled with mature



spermatozoa, and the interstitial tissue showed no signs of edema or vascular disorders.

In the experimental groups consuming highly mineralized water, significant morphological alterations were observed:

- dystrophic and vacuolar degeneration of epithelial cells;
- reduction in epithelial height;
- partial or complete destruction of stereocilia;
- dilation and congestion of blood vessels;
- interstitial edema and loosening of connective tissue;
- decreased spermatozoa content in the duct lumen.

These structural changes indicate impaired absorptive, secretory, and transport functions of the epididymis. The underlying mechanisms may include microcirculatory disturbances, tissue hypoxia, ionic imbalance, and activation of oxidative stress processes.

The reduction in sperm accumulation within the epididymal lumen suggests disruption of sperm maturation and storage, which may ultimately lead to decreased male fertility.

Conclusion

Long-term consumption of drinking water with altered chemical composition leads to pronounced morphological changes in the epididymis. These changes are characterized by epithelial degeneration, interstitial edema, vascular disorders, and a decrease in spermatozoa content in the duct lumen.

The detected structural alterations indicate functional impairment of the epididymis and may negatively affect male reproductive capacity. The results highlight the importance of drinking water quality as a significant environmental factor influencing reproductive health.

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