Central Asian Journal of Medicine

CHANGES IN THE HISTOARCHITECTONICS OF THE KIDNEYS IN POSTNATAL ONTOGENESIS DURING ALCOHOL INTOXICATION

Shukhrat J. Teshayev [1], Izzat S. Khamroev [2]

1 Doctor of Medical Sciences, Professor of of the Department of Anatomy and OKHTA, Bukhara State Medical Institute, Bukhara, Uzbekistan
E-mail: 1970morphologist@gmail.ru

2 Free candidate of the Department of Anatomy and OKHTA, Bukhara State Medical Institute, Bukhara, Uzbekistan
E-mail: Urologist77@gmail.ru

ABSTRACT

The results of the study showed that 30% of rats who consumed alcohol for 30 days developed an apoptosis ulcer in the kidneys. In 9-year-old squids who consumed alcoholic beverages for 120 days, morphological changes were observed in the kidneys, that is, in the podocytes located in the kidneys, which indicates a decrease in the expression of the Ki-67 marker during apoptosis. The proliferative activity of pathocytes is manifested in intercellular interactions.

Key words: rat, podocytes, polaren, Ki-67, BcL-2, marker.

INTRODUCTION

The relevance of the problem. Currently, the focus of modern medicine is on the problem of studying the consequences that arise when exposed to adverse environmental factors. It is impossible to imagine the existence of organisms isolated from the environment with all the diversity of its natural conditions, in particular the results of human activity. It should be noted that throughout development, environmental factors affect all living organisms. The damaging environmental factors are divided into the following: physical, chemical and biological. Among these adverse factors, ethyl alcohol and its metabolites play a major role [3,4,11,12].

Chronic alcoholism refers to a common pathology that occupies one of the first places among both the causes of morbidity and mortality of the population. In this regard, alcohol dependence should undoubtedly be considered as one of the important social problems of modern society. [7,9,13,14].

Immunohistochemical research methods are among the modern methods of pathomorphological diagnosis. The method is most often used in the diagnosis of oncological diseases, it has found wide application in the diagnosis of diseases and pathological conditions of a non-tumor nature [5]. Studies to determine the activity of alcohol-metabolizing enzymes, including in the kidneys, are few. Researchers are interested in AI, which is usually modeled in experiments on laboratory animals.

Immunohistochemical examination is currently considered one of the most informative, as it allows to determine as accurately as possible both the histogenesis of the tumor and to establish the degree of its differentiation [6].

The purpose of the work. To determine the histioarchitectonics of rat kidney tissue in postnatal ontogenesis under the influence of ethyl alcohol using immunohistochemical methods on (BcL-2 and Ki-67) markers.

Materials and methods of research. In an experimental study, white laboratory rats (females, males) were used, in the amount of 128 at newborn, 3, 6 and 12 months of age, based on the division of age periods, to identify the dynamics of changes in the morphometric parameters of the structural elements of the rat kidney in postnatal development [1,2,10].

1 month sexually mature infantile (the period of the appearance of secondary sexual characteristics)

3 month sexually mature juvenile (capable of reproduction)

6 month old reproductive young animal (active reproduction)

12 months of reproductive maturity (extinction period)

All laboratory animals were divided into 3 groups:

- the control group consisted of laboratory animals weighing 250-300 g contained only in the general vivarium standard diet, which were injected intragastrically through a probe with 1 ml of distilled water once a day for 30 days at the age of 2, 5 and 11 months of rats (n=53).

- experimental group I - laboratory animals to which 40% ethanol aqueous solution was injected with a special metal probe at a dose of 7 g / kg of weight (Sidorova P.I., 2002) daily,

A) for 3-month-olds starting from the age of 2 (61 days) months,

B) for 6-month-olds from the age of 5 months (151 days)

C) for 12-month-olds from the age of 11 months (331 days);

- experimental group II - laboratory animals who, after forced chronic alcohol intoxication by injection into the stomach with a special metal probe in the afternoon, received: biologically active food additive polaren syrup at the rate of 7g / kg of weight.

A) for 3-month-olds starting from the age of 2 (61 days) months,

B) for 6-month-olds from the age of 5 months (151 days)

C) for 12-month-olds from the age of 11 months (331 days);

After 30 days of forced chronic alcohol intoxication of laboratory animals, the slaughter of rats was performed at newborn, 3, 6 and 12 months of age under ether anesthesia. During the killing and autopsy of laboratory animals, the rules of biological safety and ethical principles of working with laboratory animals were observed.

Animals were weighed, as well as the absolute and relative weight of the kidneys were weighed and determined. The kidneys were fixed in 10% neutral formalin, then passed through alcohols of increasing concentration and poured into paraffin.

Paraffin sections of the kidney with a thickness of 5-8 microns were stained with hematoxylin and eosin, Van Gieson. Renal cell morphometry was performed using an eyepiece micrometer DN-107T/ Model NLCD-307B (Novel, China).

For the morphometric analysis of the structural components of the kidneys in rats (control, experimental and correction group), the following parameters were determined on paraffin sections:

The thickness of the kidney capsule at the levels of the upper, lower poles and gates of the kidneys in microns.;

The diameter of the glomerulus, the thickness of the Shumlyansky-Bowman capsule, and the lumen width of the proximal, distal, and collecting tubules in microns were studied.

The parameters of the microvessels of the kidneys were determined: the inner diameter, wall thickness of the arcuate and interlobular arteries, as well as the same parameters of the microvessels of the nephron of the adducting and diverting arterioles.

The results of the discussions.

When examining kidney tissue in white mongrel 3-month-old rats who experimentally consumed alcohol for 30 days, morphological changes in the form of apoptosis progression on podocytes in a focal form were found. This process suggests that alcohol intoxication of necrobiotic podocytes led to a decrease in the function of the BcL-2 gene, and conversely, an increase in the process of apoptosis in podocytes. Accumulation of a small amount of APAF1 protein in the cytoplasm

of the proximal tubules and a change in the cytoplasm to a pale brown color indicates an inactive state of apoptosis. The negative expression of the Ki-67 marker explains that the cell functions are in the G-0 phase.

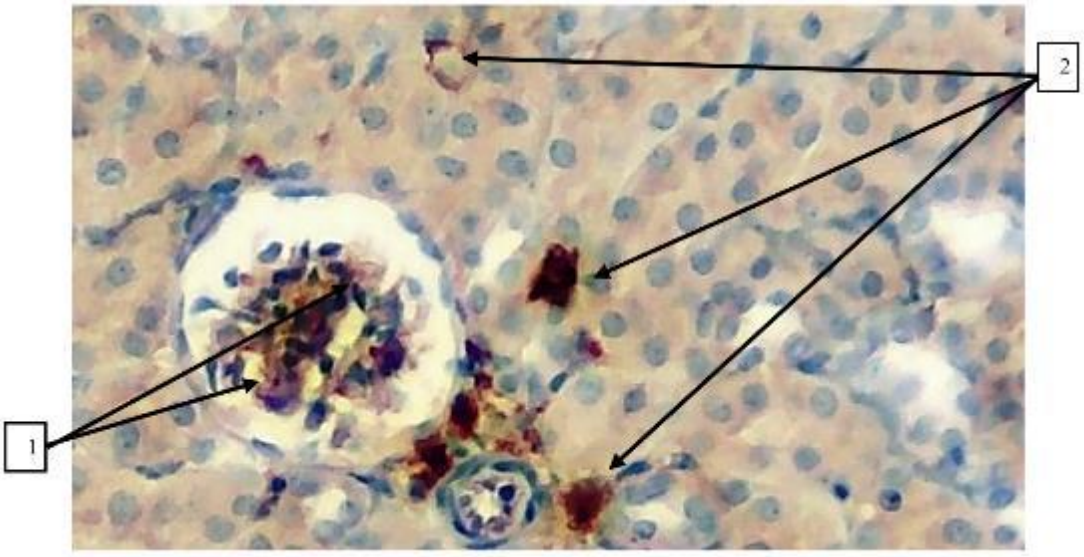


Fig.3.3.2. Renal tissue. A large number of histioarchitectonics of kidney tissue without features. On the podocytes in a wonderful set inside the glomerulus, there is a high expression of BcL-2 (1), in the cytoplasm of the epithelium of the proximal tubules, changes in the form of a brown-golden color are visible, which indicates the activation of the protein (ARF1) located inside the cells and the positive expression of the BcL-2 marker (2). Dab chromogen staining. about 40x10 vol.

When examining kidney tissue in white mongrel 6-month-old rats who experimentally consumed alcohol for 30 days, morphological changes were found, namely activation and intensification of the process of apoptosis in podocytes due to their functional load. This process is due to the fact that when exposed to alcohol intoxication, edema forms in the Bowman space and leads to compression deformation of podocytes, which serves as a stimulating factor of apoptosis**.** The high expression of the BcL-2 marker proves the increased process of apoptosis due to functional load. An increase in the APAF1 protein in the cytoplasm of the proximal tubules and condensation in the nucleus, staining brown indicates an activated state of the apoptosis process. The very low expression of the Ki-67 marker expresses the development of the proliferation process in a focal form in necrotized epithelial cells.

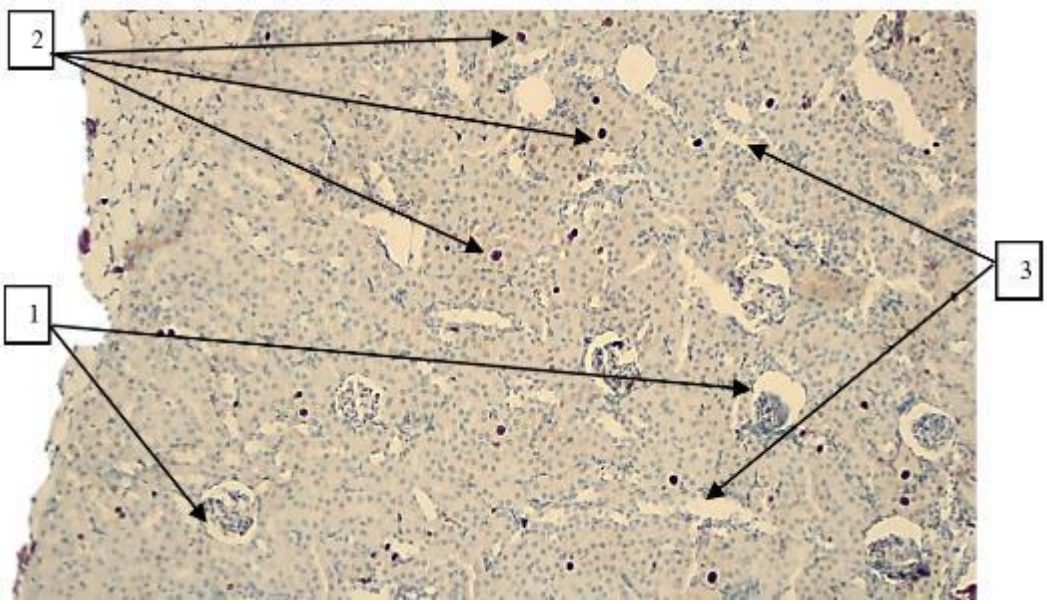
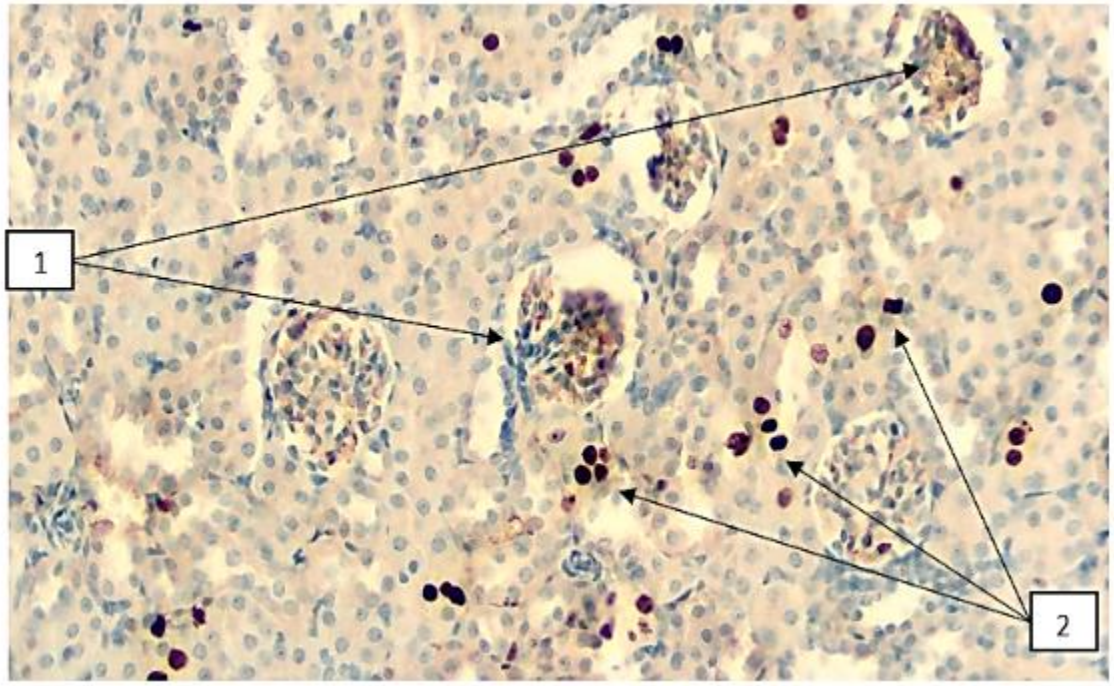


Fig. 3.3.3. Renal tissue. Most of the glomeruli located in the cortical layer of the kidney have an edematous pattern (1), a low degree of expression of the Ki-67 marker is noted (2), foci of edema are found in the interstitial space between the proximal tubules (3). Dab chromogen staining. about 20x10 vol.



Pic. 3.3.12. Renal tissue. Low expression of the focal marker BcL-2 is detected in the cytoplasm of mesangial cells (1), positive expression of the marker BcL-2 is detected in the epithelial cells of the proximal canal (2). Dab chromogen staining. About 40x10 vol.

Morphological changes in the kidneys of 9-month-old white rats who consumed alcohol for 120 days under experimental conditions. The low expression of the Ki-67 marker in the podocytes located in the renal glomeruli indicates that the podocytes have recovered after alcohol intoxication and their proliferative

activity is close to normal values. The low expression of the BcL-2 marker in podocytes indicates a decrease in the process of apoptosis. The positive expression of the BcL-2 marker in the epithelium of the proximal tubules indicates the continuation of the focal process of apoptosis in the damaged prismatic epithelium. This process means that the APAF1 protein is inactive in the cytoplasm and the reparative regeneration process dominates.

Conclusion. Thus, an immunohistochemical study showed that alcohol intoxication enhances the process of podocyte apoptosis (very low expression of the Ki-67 marker) and slows down the proliferation of necrotized epithelial cells (decrease in the function of the BcL-2 marker).

REFERENCES

1. Geliashvili O.A. Variants of periodization of rats at biologically similar stages of human and rat ontogenesis. Saratov scientific and medical journal No. 4 No. 22. October December. pp. 125-126.

2. Zapadnyuk I.P., Zapadnyuk V.I. Laboratory animals. Breeding, maintenance, use in experiment. 1983. 381 p.

3. Kovalev A.V., Nikitin A.M., Romanenko G.Kh., Zavalishina L.E. Pathomorphological changes in the kidneys during acute and chronic alcohol intoxication. Forensic-medical examination. 2022;65(1):52–56. https://doi.org/10.17116/sudmed20226501152

4. Kursov S.V. Acute alcohol poisoning. Emergency Medicine No. 7-8 (46-47), 2012

5. Kumar G.L., Rudbeck L. Immunohistochemical methods: Guide. Per. from English Frank G.A., Malkov P.G., Danilova N.V., Moskvina L.V., Zavalishina L.E., Gafullin N.M., Andreeva Yu.Yu. M.: DAKO; 2011. Kumar G.L., Rudbe

6. Petrov S.V., Raikhlin N.T. (ed.) Guide to the immunohistochemical diagnosis of human tumors. 4th edition, expanded and revised. Kazan, 2012, 624

7. Pigolkin Yu.I. Neurohistochemical studies in forensic medicine / Yu.I. Pigolkin, Yu.E. Morozov // Pacific Medical Ocean. – 2012. – No. 2. – pp. 89–93.

8. Sidorova P.I. Use of laboratory animals in toxicological experiments: guidelines. Arkhangelsk. 2002;15.

9. Yagmurov O.D. On the issue of morphological diagnosis of alcoholic heart disease / O.D. Yagmurov // Current issues of prevention and laboratory diagnostics in forensic medical examination: collection. scientific articles. – St. Petersburg, 2013. – pp. 59–62

10. Tuksanova N. E. The Effect of Alcohol on the Structures and Vessels of the Brain. International Journal of Health Systems and Medical Science ISSN: 2833-7433Volume 1 | No 5 | Nov-2022.

11. Tukhsanova N.E. Changes in the Parameters of the Intraorgan Vessels of the Kidneys of Rats with Chronic Alcoholism and Correction of Polarene. Published under an exclusive license by open access journals . Volume: 2 Issue: 12 | Dec – 2023 . pp. 426-430

12. Tukhsanova N.E. The effect of ethyl alcohol on the central nervous system of humans and animals./. Bulletin of the TMA No. 5, 2022. pp. 43-46

13. Tuksanova N. E. Changes in the morphometricparameters of the small intestineof rats are normal and under theinfluence of adverse.jJournal of healthcare and li-science research Vol. 2, No. 5, 2023 ISSN: 2181-4368

14. Tuksanova Nasiba Esanovna, Shaxnoza Muzaffarovna Kamalova. The Influence Of Harmful Environmental Factors On The Anatomical Parameters Of The Small Intestine Of Rats.Journal of Pharmaceutical Negative Results ¦ Volume 13 ¦ Special Issue 9 ¦ 2022P. 3502-3506.