UDC: 614.88 : 546.26-099-06:616.831

STUDY OF MORPHOLOGICAL CHANGES IN THE FRONTAL CORTEX OF THE CEREBRAL HEMISPHERES AFTER CORRECTION WITH MILK THISTLE EXTRACT IN EXPERIMENTAL CARBON MONOXIDE INTOXICATION IN WHITE OUTBRED RATS DURING POSTNATAL ONTOGENESIS

Bakhronov Shukhrat Yakhyoevich
Sultonova Lola Jakhonkulovna
Department of Anatomy and Clinical Anatomy (DCA) of the Bukhara State Medical Institute named after Abu Ali ibn Sina.

Aim of the study. The aim of this study was to identify morphological and morphometric changes in the frontal cortex of the cerebral hemispheres in 18-month-old white outbred rats under conditions of chronic carbon monoxide intoxication, as well as to evaluate the neuroprotective effect of correction with Silybum marianum (milk thistle) extract.

Materials and methods. The experiment was conducted on 30 white outbred male rats aged 18 months. The animals were divided into three groups: control (n=10), experimental (n=10), and correction group (n=10).

Chronic carbon monoxide intoxication was modeled by daily exposure of animals in a sealed chamber to carbon monoxide at a concentration of 50-200 ppm for 2 hours per day over 21 days.

Animals in the correction group received milk thistle (Silybum marianum) extract at a dose of 100-200 mg/kg via enteral administration using a metal probe for 14 days.

At the end of the experiment, brain tissue samples from the frontal cortex were processed using standard histological techniques and stained with hematoxylin and eosin. Morphological and morphometric analyses were performed.

Results. In the control group, the cortical architecture was generally preserved; however, age-related involutive changes were observed. These included decreased neuronal density, shortening of dendritic processes, hyperchromia, and partial chromatolysis. Morphometrically, the thickness of the molecular, external granular, and external pyramidal layers was 95.0 μm, 100.0 μm, and 185.0 μm, respectively.

In animals exposed to carbon monoxide, a marked reduction in neuronal population, expansion of intercellular spaces, increased chromatolysis, membrane destruction of neurocytes, and cellular shrinkage were observed. Perineuronal edema, microcirculatory stasis, and inflammatory changes were also noted. Morphometric analysis revealed a

reduction in cortical layer thickness: 1.5-fold in the molecular layer, 1.3-fold in the external granular layer, and 1.2-fold in the external pyramidal layer.

After phytocorrection with milk thistle extract, a partial reduction in destructive changes in the cerebral cortex was observed. A decrease in the intensity of chromatolysis, improved preservation of dendritic structures, reduced glial reaction, and normochromic staining of neuronal cytoplasm were noted. However, age-related morphological alterations such as neuronal polymorphism, membrane deformation, and nuclear asymmetry were not completely eliminated.

Conclusions. Chronic carbon monoxide intoxication induces pronounced hypoxic-dystrophic and degenerative changes in the frontal cortex of the cerebral hemispheres in 18-month-old rats. These changes are characterized by decreased neuronal number, chromatolysis, membrane destruction, and cortical layer atrophy.

The use of milk thistle extract contributes to a reduction in the severity of destructive processes, partial preservation of the dendritic apparatus, and a decrease in the neuroglial reaction. The obtained results confirm the antioxidant and neuroprotective properties of the preparation and suggest its potential use as a corrective agent in hypoxic brain injuries.

REFERENCES:

1. Aliev H.M., Rakhimov F.N. Histological changes in the microcirculatory bed of the brain under carbon monoxide intoxication // Pathological Physiology and Experimental Therapy. – 2021. – Vol. 65, No. 4. – P. 34–39.
2. Bekmurodov B.T., Yuldashev N.K. Morphometric characteristics of neocortical neurons in aging rats // Journal of Anatomy and Histopathology. – 2022. – Vol. 11, No. 3. – P. 42–47.
3. Ganiev K.K., Ismoilov J.A. Cytological features of neuronal degeneration in hypoxic brain injury // Archives of Pathology. – 2019. – Vol. 81, No. 5. – P. 51–56.
4. Abenavoli L., Izzo A.A., Milic N. et al. Milk thistle (Silybum marianum): A concise overview on its chemistry and pharmacological uses // Phytotherapy Research. – 2018. – Vol. 32, No. 11. – P. 2202–2213.