PHARMACOLOGICAL EFFECTS OF CISTANCHE SALSA, WHICH GROWS IN THE ARAL REGION.

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Relevance. Plants of the Cistanche genus, known in Eastern medicine as "desert ginseng," possess a wide range of biological activity. However, the chemical composition and severity of pharmacological effects are highly dependent on the growing area and environmental factors. The Aral Sea region is characterized by extreme conditions: high soil salinity, sharp temperature fluctuations, and moisture scarcity. According to the adaptive synthesis hypothesis, halophyte plants accumulate an increased amount of secondary metabolites (phenylethanoid glycosides, iridoids, and polysaccharides) under conditions of severe abiotic stress. Researching the pharmacological profile of specifically the Aral Sea population of Cistanche salsa is of strategic importance for creating domestic adaptogenic drugs and the rational use of regional bioresources.

Purpose of the study. Comprehensive assessment of the pharmacological effects of Cistanche salsa extracts growing in the Aral Sea region and determination of the correlation between the content of active substances and their biological action.

Materials and methods. Wild specimens of the above-ground and underground parts of Cistanche salsa collected during the spring period in the Kungrad and Muynak districts (Republic of Karakalpakstan). Production of water-alcohol extracts using fractional maceration. Qualitative and quantitative analyses were performed using high-performance liquid chromatography (HPC) to determine the levels of echinocoside and acteozide. Assessment of antioxidant activity using the DPPH free radical binding method. Evaluation of the immunomodulatory effect on laboratory mice (BALB/c line) based on the level of lymphocyte proliferation. Modeling hypoxia in rats to study neuronal survival.

Results. Analysis revealed that samples from the Aral Sea region contained significant amounts of phenylethanoid glycosides. Echinacoside content averaged 2.8–3.4%, higher than levels for populations from less arid zones. This confirms the plant's adaptive response to salt stress. The extract demonstrated high free radical scavenging properties. The mechanism of action is due to the presence of phenolic hydroxyl groups, which effectively donate electrons, preventing lipid

peroxidation. When the extract was administered orally at a dose of 100 mg/kg for 14 days, the following was observed in experimental animals: An increase in the spleen and thymus index. An increase in the phagocytic activity of macrophages by 25-30%. Stimulation of the production of interleukin-2 (IL-2). Under experimental cerebral ischemia conditions, Cistanche salsa extract reduced malondialdehyde levels (a marker of cell damage) and maintained superoxide dismutase activity. This indicates the drug's ability to protect neurons from oxidative stress and apoptosis.

Conclusions. The conditions of the Aral Sea region facilitate the accumulation of high levels of biologically active substances in Cistanche salsa, particularly echinacoside and acteoside. The plant exhibits pronounced antioxidant and immunostimulant properties, surpassing commercial analogues from other regions in several respects. The obtained data support the development of herbal remedies based on Aral Sea Cistanche for the prevention of age-related neurodegenerative changes and the correction of immunodeficiency conditions. Given the value of this raw material, it is necessary to develop methods for cultivating Cistanche in the saline soils of the Aral Sea region to preserve the wild population.