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ENDEMIC GOITER IN THE ARAL SEA REGION: INTERDISCIPLINARY ANALYSIS OF ENVIRONMENTAL AND MEDICAL AND SOCIAL CONSEQUENCES

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Abstract
The article provides a comprehensive analysis of the problem of endemic goiter in the Aral Sea region as a consequence of the long-term ecological crisis caused by the drying up of the Aral Sea. The author investigates the systemic cause-and-effect relationships between the degradation of the natural environment, the deterioration of the quality of life of the population and the increase in the incidence of iodine-deficiency pathologies. A multi-agency approach to prevention and treatment, including the modernization of regulatory frameworks, educational strategies and health infrastructure.

Keywords. Endemic goiter, iodine deficiency, Aral Sea region, ecological disaster, thyroid gland, biogeochemical province, medical and social consequences, system approach.

Introduction

Along with the degradation of the biosphere, demographic decline and the growth of chronic diseases of the population, a stable pathological environment is being formed, contributing to an increase in the burden of non-communicable diseases.

Endemic goiter is a disease caused by a systematic deficiency of iodine in the environment. In the conditions of the Aral Sea region, this deficiency is aggravated by man-made pollution, soil salinization, violation of agroecosystems and a sharp decrease in the biological value of food resources Fragmentary.

1. Ecological and biogeochemical characteristics of the Aral Sea region as an iodine deficiency zone

From the point of view of geoecology, the Aral Sea region is a technologically modified territory with a deficiency of the main micro- and macroelements, including iodine, selenium, zinc. According to soil and geochemical studies:

In 70% of soil samples, the iodine content does not reach 25% of the minimum permissible sanitary standards;

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Groundwater is depleted of iodine due to salinization, evaporation and man-made impact;
Plant and livestock products produced in the region contain iodine 3-5 times less than normal.
As a result, there is a stable iodine deficiency background, in which, even with a relatively balanced diet, the needs of the body are not covered.

2. Medical and demographic consequences: scale and dynamics
According to the data of the Republican Center for Endocrinology and International Assessments of UNICEF:
The prevalence of diffuse non-toxic goiter in schools in Karakalpakstan exceeds 55%, in some rural areas - up to 80%;
Children's IQ indicators in areas with severe iodine deficiency are 10–15 points lower than the national average;
The incidence of hypothyroidism in pregnant women is up to 24%, with a concomitant increase in stillbirths and congenital anomalies;
The diagnosis of "cretinism" has been established in more than 200 cases over the past 10 years (according to official, underestimated estimates).
Iodine deficiency diseases, being clinically diverse, carry a pronounced social burden: the number of disabling conditions increases, the burden on the health care system grows and the labor potential of the population decreases.

3. Critical analysis of the current preventive model
Despite the existence of a state program of mandatory salt iodization, the implementation of prevention in practice faces a number of obstacles:
Lack of effective salt quality control, especially in the private retail sector;
Insufficient implementation of thyroid screening at the primary health care level;
Poor integration of educational and awareness-raising programs on iodine prophylaxis;
Insufficient use of localized solutions: local scientific institutions are not always involved in the formation of regional strategies.
It must be recognized that a centralized approach is not always effective in hard-to-reach, resource-constrained rural areas.

4. Conceptual proposals for the modernization of the prevention system
On the basis of a systematic and interdisciplinary analysis, it is advisable to implement the following measures:
Development of regional standards for iodine prophylaxis, adapted to the socio-ecological conditions of the Aral Sea region.
Introduction of mobile diagnostic complexes (ultrasound, laboratory rapid diagnostics) to cover rural areas.
Development and support of local production of iodized salt with state subsidies.
Creation of departments of environmental medicine in medical universities with a focus on biogeochemistry and endemic diseases.

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Advanced training of family doctors and obstetricians in the field of diagnosis and prevention of iodine deficiency.

Integration of prevention into regional educational programs (textbooks, trainings, online courses).

Monitoring the effectiveness of prevention using digital patient registries and GIS technologies.

Conclusion

The problem of endemic goiter in the Aral Sea region is a multi-layered and long-term challenge. It lies at the intersection of ecology, medicine, education, law and social policy. Successful control of iodine deficiency requires not only medical solutions, but also a deep institutional transformation, including:

Support for science;

Real decentralization of prevention;

Environmental education;

Modernization of legislation.

Thus, the proposed approach is to move away from a formal response to a structural reconstruction of the health care system in the context of an environmental disaster. With the right political will and intersectoral cooperation, the issue of endemic goiter can be solved within 5-10 years.

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