CONCERNING THE QUESTION OF ADAPTATION OF CHILDREN-NORTHERNERS TO NEW CLIMATIC GEOGRAPHIC LIVING CONDITIONS IN THE CENTRAL SIBERIAN REGIONS

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Abstract

In article the concept about adaptation, adaptation stages are given. Questions of influence of adverse factors of Far North on a state of health of the children's population of these regions, features of a course of adaptation process at children who have moved to a constant residence in new climate-geographical conditions of accommodation are in detail considered.

Keywords: children, adaptation, adaptation and disadaptation mechanisms.

Adaptation is a process of adjustment of the organism to changing environmental conditions; it is an international term meaning accommodation of the organism to general natural, industrial, and social conditions. This term is used to name all kinds of innate and acquired adaptive activities with the processes on the cellular, organic, systemic, and body levels. Adaptation is, no doubt, one of the fundamental qualities of the living matter. It is an integral feature of all known forms of life, so comprehensive that not infrequently it is equated to the very notion of life [1].

Theoretical prerequisites of adaptation are disclosed in G. Selye's doctrine on the general adaptation syndrome [27]. Adaptive result can become apparent on the molecular, cellular, homeostatic, behavioral and psychic levels of organization of the entire organism. At the same time the healthy is characterized by the well-coordinated cooperation of different functional systems providing optimal homeostasis and adaptation to the habitation conditions [5].

In the process of adaptation under the influence of very strong or long impact of unfavourable environmental factors or because of the weakness of adaptive mechanisms disadaptation (derangement of adaptation) develops in the organism followed by pathological conditions – diseases of adaptation [2,3].

Between 'health' and 'pathology' there is a wide range of transitional conditions which were systemized by Baevsky R.M. from the point of view of adaptation theory:

- condition of satisfactory adaptation to the environmental conditions when homeostasis is maintained at the minimal tension of the regulatory systems;

- condition of tension of adaptive mechanisms at which homeostasis is maintained thanks to certain tension of the regulatory systems;

- condition of unsatisfactory adaptation to the environmental conditions which is characterized by decrease of functional reserve accompanied by the following increase of the regulatory systems tension and is the evidence of latent or initial pathology;

- derangement of adaptive mechanisms is seen when functional reserves are significantly reduced; homeostasis is broken [4,5].

From the clinician's point of view, three conditions are distinguished (in accordance with the stages of adaptation process): 1) premorbid condition (unsatisfactory adaptation); 2) prenosological condition (tension of adaptive mechanisms); 3) pathological condition (derangement of adaptation). Diagnosis of premorbid and prenosological conditions is a complicated and important problem in medicine [1,3].

There are two stages in the development of the majority of adaptation responses: initial stage of urgent but unfinished adaptation and long lasting adaptation originating from repeated realization of urgent adaptation in prolonged effect of the environmental factors on the organism.

The most significant negative stress-factors in the conditions of the far-away northern regions which influence the state of health, mental and physical efficiency, physical development, the course of the disease include effect of low temperature, long lasting solar insufficiency, sharp drops of atmospheric pressure, changes of partial oxygen pressure, magnetic storms, relationship of the physical condition and the season, etc. [6].

Man's activities in the conditions of the far-away northern regions go by at the breaking point of their physiological potentials at almost total mobilization of functional reserves. Stable adaptation is connected with permanent tension of controlling mechanisms, change of nerve and humoral relations, which in certain conditions can deplete. In the course of the development of adaptive processes hormonal mechanisms are the most exhaustible link. This process may result in temporary disadaptation as one of the last stages in adaptation to high doses of harmful factors [10].

The problem of adaptation and disadaptation is of large importance for the population living in the conditions of northern latitudes. Extreme conditions of the far-away northern regions worsen the qualitative characteristics of health, reduce reserve capabilities of homeostatic systems and can contribute to the development of pathology. Ecological conditions of the far-away northern regions

markedly influence the formation of the growing organism, its condition, and the development of its physiological systems [6,8,9,10].

The cardio-vascular system is a universal indicator of functional reserves and compensatory adjusting functions of the organism including adaptation to new environmental conditions [8,12]. The cardio-vascular system is one of the first to react to unfavourable conditions of the environment and to take part in the process of adaptation to extreme conditions [15,19,20].

Functional immaturity of the cardio-respiratory system in children in the conditions of the North becomes apparent in decrease of the threshold level of the intensity of physical exercise in which switching of the breathing and heart work regulatory type from volume to frequency takes place, it decreasing the efficacy of the organism response to the external action. This switching is accompanied by pulse acceleration, increase of blood pressure, and that of resistance of peripheral vessels, hypertrophy of the cardiac parts, cardiac rhythm disturbance, and disorders of the vegetative regulation [16,17,18,19,21,23,24].

The research showed that the process of adaptation to the conditions of the North is accompanied by the development of morphological and functional changes in the pulmonary circulation, not infrequently by the formation of the syndrome of primary northern arterial hypertension of the pulmonary circulation [20,21,25]. Arterial hypotonia is one of the most wide-spread pathologies in the conditions of the North [8].

In long habitation in the far-away regions of the North (10 years and more) the further change of circulatory system functioning takes place. It is characterized by the tendency to bradycardia, marked decrease of systolic and minute blood volumes, compensatory decrease of blood pressure, and peripheral vascular resistance. One believes that it is caused by the exhaustion of regulatory mechanisms, and strengthening of parasympathetic control [12,17,19,21].

In the period of seasonal changes practically all children had listlessness, paleness, slowed down responses or non-motivated irritability, headaches, dizziness, nausea, fluctuations of blood pressure were also noted, increase of HR, sleep disorders, reduced appetite, and exacerbation of symptoms of chronic diseases. One of the factors of the decrease of children's health level in the North is sharply limited natural motor activity, i.e. pronounced hypodynamia is noted in the North. Among the factors hindering adaptation, one singles out peculiar features of educational process, immaturity of educational activity skills, individual features of child's personality, teacher's negative attitude to a pupil, unstable social status of the family, etc. [5].

In the structure of children's diseases in the majority of northern territories diseases of the alimentary tract are on the first place and those of the muscular-skeletal system on the second place.

In the considerable part of children disorders of the cognitive activities, essential developmental lagging, signs of emotional trouble, and peculiarities of cognitive activity formation were revealed. In children-northerners early and mass development of myopia and astigmatism was noted [21].

The majority of works on the study of vegetative nervous system (VNS) in the ontogenesis are devoted to the central links of regulation, membrane mechanisms of providing functional reserves and compensatory adjusting responses being studied insufficiently. The significance and necessity of the study of adaptive role of biophysical properties of the erythrocyte membrane lipid bi-layer, peculiarities of cellular response types and their importance as criteria for the assessment of adaptation and re-adaptation of children-migrants from the North to new climatic geographical living conditions [13].

Any adaptation process is connected with regulation readjustment of both central links of the VNS and effector links on the level of membraneous cell receptors. The interaction of membrane cell structures with the environment may be one of the primary links in the complicated chain of forming adaptive regulation type in given ecological conditions. Membranes play the leading role in the formation of adaptive responses on the level of cells, organ tissues, and the entire organism [7,14] .

The majority of membranological studies were conducted and are being conducted on the membranes of blood cells and, first of all, on erythrocytes. It is conditioned by the fact that there is no nucleus, mitochondrion and other intracellular structures. The membrane preparations isolated from these cells are relatively homogeneous and are not contaminated by other membranes. Erythrocyte membranes are relatively easy to get in big numbers, at the same time they preserve their native properties, it being a suitable test subject. The type of vegetative response is determined by the reaction of membranes in vitro on the injected hormones and mediators. The dynamics of chlortetracycline probe fluorescence is measured in time and intensity [11].

The actuality of the topic under consideration is conditioned by obvious social significance of the problem, necessity of search for its solution with the help of assessment of child's organism adaptation state to the conditions of the changed environment and revealing children with tense unsatisfactory adaptation or its break among children-northerners, the study of risk factors of adaptive processes disorders (including metabolic ones), elaboration of prophylactic measures aimed at preventing pathological syndromes and states conditioned by disadaptation (arterial hypertension, syndrome of vegetative dysfunction, syncopal conditions, recurrent headaches, rhythm disturbances of rhythm and cardial conduction) and social and psychological disadaptation in children-migrants from the North.

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