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USE OF PHYTOADAPTOGENS FOR THE CORRECTION OF COLD STRESS ON THE BODY

ABSTRACT

The purpose of this research was to study the possibility of using a mixture of phytoadaptogens for the correction of the body's compensatory responses to the conditions of low temperatures.Experiments have been conducted on experimental animals (50 white mongrel rats-males weighing 180-200 g) in accordance with generally accepted methodological approaches. Research of cold adaptation reactions of experimental animals have been conducted by using the model of a long cold action with appropriate climatic chamber.It was established experimentally that in doses of 150-300 mg/kg daily of the studied mixture has a strong antioxidant effect in the conditions of cold stress on warm-blooded organism. The research allowsusing a mixture of phytoadaptogens as a regulator of adaptive reactions of the organism when exposed to low temperatures.

Keywords:cold effect,resistance of organism,phytoadaptogens.

Introduction

One of the most important problems of studying environmental impacts on humans and animals is considered to be the stress effect of cold. Currently, the most significant national priorities which represent the basis of innovative development of the country are rapid socio-economic development of the Arctic territory andconstruction and operation of the first Russian civil cosmodrome «Vostochny» in the cold winter of the Amur region[1].

These tactical and strategic directions are realized in cold climatic conditions of environment that causes relevance of a problem of adaptation of the population of the Russian Federation to temperature stress. In this regard, it is interest to study the mechanisms of adaptation reactions of the warm-blooded organism to low temperatures, because the depletion of reserves of organs and systems is possible until the adaptation is achieved [2-4].

The development of the state of disadaptation in cold stress is possible to prevent by system of hygienic measures, correction of diets of the population with the use of adaptogenic products from animal or plant origin [4].

A promising component for the production of a mixture of substances used in the nutrition of the warm-blooded organism during exposure to low temperatures an important role can be assigned to Hypericumperforatum (HP) and Rhodiolarosea (RR).

The aim of the present work was to investigate the possibility of using the mixture of HP and RR for the correction of compensatory reactions of the organism to low temperatures.

Materials and methods

The work was performed under standard conditions of vivarium of Amur State Medical Academy. Experiments were carried out observing the rulesof the "European Convention for theprotection of vertebrate animals usedfor experimental and other scientificpurposes" (Strasburg, 1986) and theorder of the RF Health Ministry №267concerning the GLP rules (19.06.2003). Experiments on the study of cold adaptive reactions of laboratory animals with the introduction of a mixture of HP and RR using a model of long-term cold exposure were performed on 50 white rats-males with body mass 180-200 g for 10 individuals in the group.

The study of cold adaptation reactions of animals was carried out on the model of long-term cold exposure for 28 days with the introduction of a mixture of HP and RR [2].The animals were divided into 5 groups: 1st- intact rats were kept in standard vivarium conditions; 2nd – control group, animals were subjected to cooling; 3rd, 4th, 5thgroups – the experimental groups, before placing the rats in climatic chamber in a small amount of feed added a mixture of HP and RR in powder form in the dose of 30 mg/kg; 150 mg/kg; 300 mg/kg respectively. The study of biochemical parameters was carried out on the 7th, 14th, 21st, 28th days of cold exposure.

After the experiment, the animals were decapitated under ether narcosis. The study was approved by the Ethics Committee of the Amur State Medical Academy. The statistical processing was carried out by the standard method with the use of the Student's t-criterion.

Results and discussion

The effect of cold affects the increase in lipid peroxidation products (LPP) in the blood of rats.The results of experimental studies have shown that the prolonged action of cold on the warm-blooded organism observed an increase in the content of all products of peroxide reactions on the 7th, 14th, 21st and 28th days.It was found that the introduction of a mixture of HP and RR in doses of 150 mg/kg and 300 mg/kg significantly reduced the content of the LPP in all research periods.Significant changes in the content of the LPP under the introduction of phytoadaptogenic mixture at a dose of 30 mg / kg have not been registered.

Most of all, the content of hydroperoxides of lipids during cold exposure decreased on the 14th day under the introduction of a mixture of HP and RR at a dose of 300 mg / kg and amounted to 19,93±0,92nmol/ml;the concentration of diene conjugates is maximally reduced on the 28th day under the introduction of the mixture at a dose of 150 and 300 mg / kg; the content of malonicdialdehyde decreased in all days of research, especially on the 21st day of the experiment(table).

Thus, feeding an experimental animals the mixture of HP and RR during prolonged cold stress leaded to decrease in the formation of LPP in the blood of rats, that's why an increase in the level of adaptive reactions were leads.

Conclusion

We have first experimentally confirmed and substantiated the effectiveness of phytoadaptogens mixture of HP and RR with the purpose of correction of oxidative stress under conditions of cold stress on warm-blooded organism.The experiments allow recommending the studied mixture as a regulator of adaptive reactions of the organism under the influence of low temperatures.

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The concentration of products of lipid peroxidation in blood of rats during prolonged cold stress and using the phytoadaptogens mixture (M±m, n =10)

Indicators, nmol / ml	The period of the experiment, day	Intactgroup	Controlgroup	The experimental group: cold+30 mg/kg of the mixture	The experimental group: cold+150 mg/kg of the mixture	The experimental group: cold+300 mg/kg of the mixture
Hydroperoxideoflipids	7th	17,63±0,46	31,13±0,81*	30,26±0,63	27,82±0,91**	23,83±1,5**
	14th	18,09±0,39	29,15±1,0*	28,5±1,3	28,85±2,5**	19,93±0,92**
	21st	17,03±0,51	30,25±0,9*	30,10±1,02	26,12±2,2**	22,97±0,41**
	28th	17,9±0,56	28,6±2,6*	28,4±2,3	25,3±3,2**	20,71±0,67**
Dieneconjugates	7th	91,77±1,6	112,77±2,3*	113,12±5,3	106,71±6,5**	89,16±2,39**
	14th	90,52±1,0	124,63±1,6*	120,46±2,5	116,52±3,5**	99,42±2,6**
	21st	86,6±0,5	119,56±1,4*	119,45±2,6	109,22±1,7**	95,42±2,1**
	28th	89,11±1,2	120,9±3,3*	119,16±5,3	106,41±2,1**	94,1±3,8**
Malonicdialdehyde	7th	0,7±0,9	2,72±0,18*	2,43±0,05	1,8±0,1**	1,0±0,07**
	14th	0,97±0,15	3,15±0,31*	3,08±0,13	2,47±0,3**	1,49±0,08**
	21st	1,13±0,1	4,57±0,12*	3,8±0,52	3,3±0,3**	1,74±0,01**
	28th	1,17±0,2	3,25±0,31*	3,25±0,52	2,61±0,35**	1,13±0,33**

* - differences between intact and control groups (p<0,05); ** - differences between control and experimental groups (p<0,05).

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EVALUTION OF THE INDICES OF HEMODYNAMICS IN THE ARCTIC ZONE RESIDENTS FROM THE POSITION OF «GOLDEN RATIO»

ABSTRACT

The data of arterial pressure of 91 residents of the Arctic zone of the Republic of Sakha (Yakutia) from the position of «golden ratio» was investigated. It was revealed that the most harmonious blood pressure is found in the Chukchi and Yukagirs, and it is confirmed by the highest percentage of those with a diagnosis «healthy».

Keywords:arterial blood pressure, arterial hypertension, golden ratio.

Introduction. Currently arterial hypertension (AH) remains to be one of the most significant medical and social problems, as it is an important risk factor of cardiovascular diseases, mainly determining high mortality rates in our country and around the world in general.

The blood circulatory system in Russia accounts for more than a half of deaths and 46% of disabilities in Russia. According to the results of 2016, cardiovascular diseases occupied the second ranked place in the structure of general morbidity of the adult population, meaning that it got 14.5% (3172 per 100000 of the total population), and the hypertensive heart disease got 674,6 per 100000 of the total population [5,8].

Based on the results of the conducted representative survey of the population of SakhaRepublicin 2003, the prevalence rate of arterial hypertension (AH) averaged 0.3 ± 0.8%.Among the indigenous population of Yakutia, the incidence of AH is slightly less than in the non-indigenous population (22.9 and 27.7% respectively). However, the prevalence rate of AH suddenly increases to 29.3% and more in the indigenous population starting from the 6th decade of life [9].

Unfortunately, in recent years, despite all the health care efforts, the sickness