Effect of Dry Extract of Gerania Holmova on Hypoxia in Experimental Animals

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ABSTRACT

Antihypoxants are increasingly prescribed as part of combined pharmacotherapy for various diseases accompanied by conditions of hypoxia and ischemia. If we outline the range of main indications for the use of antihypoxants, then we can identify such significant areas of their use as neuroprotection, cardioprotection, angiprotection, hepatoprotection, gastroprotection [4]. In practical medicine, antihypoxants with different mechanisms of action are used

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Antihypoxants are increasingly prescribed as part of combined pharmacotherapy for various diseases accompanied by conditions of hypoxia and ischemia. If we outline the range of main indications for the use of antihypoxants, then we can identify such significant areas of their use as neuroprotection, cardioprotection, angiprotection, hepatoprotection, gastroprotection [4]. In practical medicine, antihypoxants with different mechanisms of action are used:

1. Correctors of impaired electron transport function of MFC I (1st mitochondrial enzyme complex). These include, in particular, quinone derivatives, riboflavin derivatives, nicotinamide, hypoxen.
2. Activators of compensatory metabolic flows. To prevent early disorders of the respiratory chain, it is possible to use agents that enhance compensatory metabolic flows independent of the NADH oxidase pathway, especially the use of MFC II activators (mexidol, emoxipin, limontar, proxipin, reamberin, sodium hydroxybutyrate).
3. Correctors of the cytochrome region of the respiratory chain. This group includes drugs that are natural for the body components of the mitochondrial respiratory chain involved in electron transfer (cytochrome C and ubiquinone), as well as combined drugs Energostim and Cytoflavin.

Antihypoxants of indirect energizing action (correctors of metabolic pathways disorders) - trimetazidine, mildronate, actovegin. But all of these drugs are synthetic and have a number of side effects [1,2].

At present, the interest of practical medicine in natural antihypoxants has significantly increased, which, without having a negative effect, increase the ability of the human body to withstand adverse effects of various nature, maintain a normal level of vital activity in hypoxic conditions [3].

Based on this, the purpose of this work was to study the antihypoxic effect of the dry extract of geranium kholmova.

Materials and methods of research: experiments were carried out on 22 white mice weighing 18-22g both sexes. Normabaric

hypoxia was induced by placing mice in a hermetic chamber. The time from the moment the animals were placed in the hermetic chamber to the complete cessation of breathing was recorded as "life expectancy". Dry extract of geranium kholmovoy was orally administered to mice at a dose of 500 mg/kg as a 1% solution.

In the next series of experiments, we studied the effect of tablets from dry extract of geranium kholmovoy on the course of normabaric hypoxia at a dose of 250 mg/kg. The experiments were carried out on 10 mice weighing 18-20 g of both sexes.

The following experiments were carried out on 32 white mice weighing 18-25g both sexes under conditions of hypobaric hypoxia. The studied preparation of geranium kholmovoy was administered orally at a dose of 500 mg/kg as a 1% solution. In a separate series of experiments, antihypoxic activity was studied in mice in comparison with the well-known drug mildronate. Mildronate was used at a dose of 20 mg/kg.

In order to create hypobaric hypoxia, the animals were raised to a height of 11 km at a speed of 1000 meters per minute. At this altitude, the animals were exposed for 45 minutes. At the same time, the time of the onset of a complete cessation of breathing was noted. Animals that remained alive for 45 minutes were considered survivors.

Results and its discussion. The results obtained at a dose of 200 mg/kg are given in table. No. 1

Table No. 1
Effect of dry extract on normabaric hypoxic hypoxia (NHH) when administered per os

Type of experiment	Dose	Time		Average life time, min	Note
	ml	Placement in the cell	Doom		
Control group distilled water per os"	0,49	11,20	12,04	44	
	0,40	11,21	11,53	32	
	0,36	11,22	12,11	49	
	0,38	11,23	11,52	29	
	0,36	11,23	11,53	30	
	0,36	11,25	12,12	47	
				Avg.38.5±10	100%
Dry extract of geranium hill 500 g/kg	0,36	11,20	12,05	45	The drug in the form of a 1% aqueous solution
	0,36	11,23	12,43*	80	
	0,36	11,23	12,15*	52	
	0,38	11,23	12,11	48	
	0,36	11,21	12,10*	49	
	0,36	11,20	12,00	40	
		Mean 52.3± 15.31 P<0.05			Effect 136%

Dry extract of geranium kholmovoy at a dose of 500 mg/kg lengthens life expectancy by 36% compared to the control. So, if in the control mice life expectancy averaged 38.5 ± 10 minutes, then in the experimental group, where the dry extract of geranium kholmovoy was introduced, this indicator averaged 52.3 ± 15.31 minutes

The results of the following experiments are given in table No. 2

Table No. 2

Influence of a tablet from a dry extract of geranium kholmovoy on the course of normobaric hypoxic hypoxia (NHH)

№	Weigh t in g	Type of experiment	Dose	Time			Antihypoxic action
			mg/kg	Placemen t in the cell	death	Average life time, min	
1.	19	Tablets by 0.1 250 mg/kg per os	250	11,35	12,25*	50	Control cr 35.7-100%
2.	19			11,31	12,20*	49	
3.	20			11,32	12,25*	53	
4.	22			11,36	12,22	46	
5.	20			11,34	12,15*	41	
6	20			11,35	12,10	35	
					Average 45.6± 9.5 P<0.05		127,8 %

Tablets from the dry extract of geranium cumulus at a dose of 250 mg/kg lengthen life expectancy compared to the control by 27.8%.

Therefore, the studied drug of geranium holmova has a noticeable antihypoxic effect in normabaric hypoxia.

The following experiments were carried out on a model of hypobaric hypoxia. The results are shown in table. No. 3

Table 3

Antihypoxic effect of dry extract from geranium hillock in hypobaric hypoxia

№ Group	Wei ght in g	Type of experiment	Dose	Time		Min life span	Note
			ml	Placement in the cell	Doom		
1.	25	Control group distilled water	0,2	11,40	12,04	24	
2.	20		0,2	11,21	11,53	32	
3.	20		0,2	11,35	12,03	28	
4.	18		0,2	11,23	11,52	29	
5.	19		0,2	11,25	11,59	34	
6	19		0,2	11,25	12,02	37	
				Mean 24.6±2.35			100%

Table number 3 continued

No. Group	Wei ght in g	Type of experiment	Dose	Time		Cont. min life	Note
			% ,ml	Placement in the cell	death		
1.	25	Dry extract of geranium hill 500mg/kg per os."	0,25	11,43	12,16	33	The drug in the form of a 1% aqueous solution
2.	24		0,24	11,44	12,20*	36	
3.	18		0,18	11,45	12,15*	30	
4.	20		0,2	11,45	12,22*	37	
5.	20		0,2	11,47	12,20	33	
6	20		0,2	11,50	12,21	31	
				Avg.33.3±3.2 P<0.05			135,3%

Dry extract of geranium kholmovoy at a dose of 500 mg/kg lengthens the average life span of experimental animals by 35.3% compared with the control.

Table 4

Influence of dry extract of geranium kholmovoy on the resistance of rats in the model of hypobaric hypoxia in comparison with mildronate

№	The number of mice in gr.	Drug doses, in microns/kg	Lifespan (M ± m) seconds	% surviving at 45 min. exposures at an altitude of 11 km
1.	6	Remote control water	484,5±109	12%
2.	6	Dry extract 250 mg/kg	1094±510*	33%
3.	6	Dry extract 500 mg/kg	1199±579*	37%
4.	6	Mildronate 20 mg/kg	1259±108*	37%

Note: *Reliable data at P<0.05 in relation to the control.

Therefore, the dry extract of geranium kholmovoy has a pronounced antihypoxic effect in hypobaric hypoxia.

Conclusions:

1. Dry extract of geranium kholmovoy has an antihypoxic effect in various experimental models of hypoxia.
2. In terms of efficiency, the dry extract of geranium kholmovoy is not inferior to the comparison drug - mildronate.

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