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EXPERIMENTAL DETERMINATION OF ADAPTOGENIC PROPERTIES OF PULSATILLA PATENS AQUEOUS EXTRACT UNDER IMMOBILIZATION STRESS

Abstract. *In an experiment on laboratory animals we determined adaptogenic properties of pulsatilla patens aqueous extract (1:10) in different volumes under an immobilization stress. Analysis of the experimental results shows that the pulsatilla patens aqueous extract has a pronounced sedative and soporific effect.*

Keywords: *pulsatilla patens, water plant extract, immobilization stress, conjugated dienes, malondialdehyde, spectrophotometric method.*

Introduction. Different types of stress are known to be a leading cause of desynchronization of biological rhythms of functional systems of the body (neuroses, chronic fatigue, heart disease, cerebrovascular disorders), which in turn leads to a reduced quality of life [1, 2]. An urgent task of modern medical science is the search for biologically active substances with antioxidant action [3]. Herbal adaptogens are of particular interest, since they are easily incorporated into the biochemical processes of the body, providing multilateral, soft and safe effects in case of their prolonged use. Using herbal medicines is economically effective in preventive measures with the use of phyto-adaptogenes in the activation of lipid peroxidation (LPO) of cell membranes, induced by an adverse influence of environmental factors [4]. We know that the list of adaptogenic herbal medicines is limited. In this regard, continuing a search, a study and implementation of new adaptogenic herbal drugs which, besides being specifically active, would be comfortable and safe to use, is especially important [5].

Objective: is the determination of adaptogenic properties of pulsatilla patens aqueous extract (1:10) under immobilization stress.

Materials and methods. The experimental study was performed on 36 rats of WAG line with average weight of 210-230 g. Stress simulating effect was studied in a model of chronic neuromuscular tension that was reproduced within 5, 15 and 30 days [1]. Immobilization stress was simulated by keeping the rats for 5 h. daily in plastic cage-cases. The animals were divided into 6 groups with 6 animals in each of them. [1].

Animals of the first (intact) and the second

groups were administered distilled water in a volume of 1.5 mL (conditional norm) intragastric per os. The animals of the 2nd -6th groups were subjected to immobilization stress and they also were administered pulsatilla patens aqueous extract (1:10) intragastric per os (in different amounts) every day an hour before stress exposure, 3rd group - 0.5 ml 4th group – 1 ml, 5th group – 1.5 ml, 6th group – 2 ml, respectively. Animals of all groups were decapitated under ether anesthesia 5 hours after simulating immobilization stress (on the background of maximum exposure to stress). We used the blood serum, where we determined the LPO, namely: the level of primary oxidation products - conjugated dienes (CD) and secondary products - malondialdehyde (MDA) using the spectrophotometric method [6]. The same spectrophotometric method was used to determine the condition of the antioxidant system, namely: the activity of catalase and superoxide dismutase (SOD) [7].

Results and discussion. LPO condition was determined by the number of peroxidation products: CD and CTB – AP (Table). Table 1 shows that under the conditions of immobilization stress during 5 days, these figures become significantly higher: CD level by 2 times, CTB-AP by 1.5 times higher than the control; within 15 days by 2.5 and 2 times, respectively; 30 days by 3 and 2 times respectively. Within 5, 15-days pulsatilla patens aqueous extracts in a volume of 0.5 ml, 1 ml, 1.5 ml and 2ml do not statistically reliably reduce the level of CD and CTB-AP relatively to an immobilization stress. Only within 30 days all pulsatilla patens aqueous extracts statistically reliably reduce the level of CD and CTB-AP relatively to an immobilization stress and are

Table
Results of pharmacological intervention with pulsatilla patens aqueous extract (1: 10) and its effect on PLO and antioxidant system in the blood serum against the background of an immobilization stress (n=6)

Parameter	Experimen t duration	Intact animals	Immobilization stress + pulsatilla patens aqueous extract				
			0,5 ml	1 ml	1,5 ml	2 ml	
CD, mmol / l	5 days		30,72±1,06*	29,25±0,16*	27,56±0,19*	25,22 ± 0,34*	24,21±0,34*
	15 days	14,16±0,64	34,85±0,85*	28,08±0,12*	26,12±0,45*	25,04 ± 0,89*	26,32±0,39*
	30 days		37,85±0,12*	21,76±0,54',***	22,14±0,44',***	21,01 ± 0,1',***	20,2±0,12',***
	5 days		6,94±0,16*	5,89±0,17*	5,67±0,34*	5,47±0,32*	5,43±0,45*
MDA, mmol / l	15 days	4,65±0,10	7,15±0,45*	6,91±0,25*	6,44±0,21*	6,12±0,21*	6,07±0,56*
	30 days		7,56±0,78*	5,21±0,21**	5,14±0,06**	4,98±0,03**	4,17±0,67**
SOD, st.un.	5 days	3,59±0,11	6,93±0,49*	3,56±0,08**	2,98±0,35**	2,54±0,12',***	2,3±0,19',***
	15 days		6,98±0,23*	2,94±0,3',***	2,15±0,23**	2,13±0,42',***	2,21±0,31',***
	30 days		7,13±0,89*	2,12±0,15',***	2,09±0,2',***	2,11±0,19',***	2,03±0,09',***
Catalase, st.un.	5 days	5,10±0,13	5,88±0,26*	3,99±0,12',**	3,59±0,07',**	3,87±0,12',**	3,43±0,31',**
	15 days		6,03±0,21*	4,02±0,22',**	3,23±0,05',**	3,12±0,11',**	3,34±0,07',**
	30 days		6,23±0,03*	3,56±0,01',***	3,45±0,05',***	3,13±0,12',***	3,02±0,23',***

Note: * – P < 0,05 compared to the parameters in the intact animals;
 * – P < 0,05 compared to the parameters in the intact animals;
 ** – P < 0,05 compared to the parameters in the animals while simulating the immobilization stress.

close to the control (P <0.05). For instance, the

CD level under the conditions of immobilization stress +0.5 ml, 1 ml, 1.5 ml and 2 ml of pulsatilla patens aqueous extract decreases by 1,8-1,7-1,8-1,9 times respectively.

The level of CTB-AP under an immobilization stress conditions is +0.5 ml, 1 ml, 1.5 ml and 2 ml of pulsatilla patens aqueous extract decreases by 1,45-1,47-1,5-1,8 times respectively ($P < 0,05$).

The state of the antioxidant system was determined by the number of catalase and SOD products. Table. 1 shows that under the conditions of immobilization stress these figures are much higher. The level of catalase under an immobilization stress during 5 days is statistically reliably higher by 1.15 times, SOD by 2 times higher than the control; 15 days - by 1.5 and 2 times, respectively; 30 days by 2 and 2.5 times respectively ($P < 0.05$). Table. 1 shows that within 5, 15 and 30 days all pulsatilla patens aqueous extracts affect the level of catalase and SOD in the serum of rats: they statistically reliably lower these rates relatively to immobilization stress. For instance, within 5 days SOD level under immobilization stress + 0, 5 ml, 1 ml, 1.5 ml and 2 ml of pulsatilla patens aqueous extract decreases by 2-2,3-2,7-3 times respectively ($P < 0.05$). The level of catalase in conditions of immobilization stress + 0, 5 ml, 1 ml, 1.5 ml and 2 ml of pulsatilla patens aqueous extract decreases by 1,47-1,6-1,5-1,7 times respectively ($P < 0,05$). Within 15 days SOD level decreases by 2,37-3,25-3,28-3,16 times respectively ($P < 0.05$). The level of catalase decreases by 1,5-1,9-1,9-1,8 times respectively ($P < 0.05$). Within 30 days SOD decreases by 3,36-3,4-3,38-3,5 times respectively ($P < 0.05$). The level of catalase decreases by 1,75-1,8-2-2,1 times respectively ($P < 0.05$).

Conclusions. Considering the results of the study of LPO (CD and CTB-AP) parameters in conditions of chronic immobilization stress, we can conclude that these parameters do not statistically reliably get adjusted relatively to the control. Only within 30 days all pulsatilla patens aqueous extracts statistically reliably lower the levels of CD and CTB-AP relatively to immobilization stress and bring them closer to the control. A study of catalase and SOD in conditions of chronic immobilization stress shows that these rates are better adjusted than

the figures of LPO (CD and CTB-AP), it indicates that the pulsatilla patens aqueous extract possesses a strong antioxidant action. Thus, among the experimental pulsatilla patens aqueous extracts those in a volume of 1.5 and 2ml have wider impact on the processes of lipid peroxidation in the blood and antioxidant system.

Prospects for further research. The results of the study could be a foundation for the development of new domestic plant drugs with sedative and soporific effects, containing pulsatilla patens aqueous extract.

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