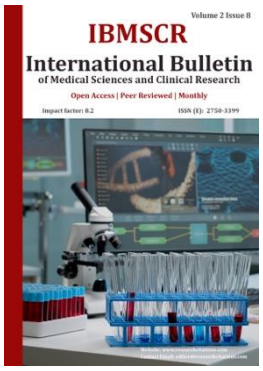

STUDYING THE EFFECT OF THE BIOLOGICALLY ACTIVE SUPPLEMENT "ADAPTOFIT" ON PHYSICAL ENDURANCE

Masharipova F.F.
Tulyaganov B.S.
Tashkent Pharmaceutical Institute
fmasharipovaf@icloud.com
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Introduction. Nowadays, no one is immune to stress and fatigue. These factors have a negative impact on human health. In such cases, adaptogens are used. Adaptogens are drugs that adapt the body to various adverse conditions, increase physical and mental endurance, reduce fatigue, and normalize sleep. In recent decades, medicinal plants such as eleutherococcus, rhodiola rosea, astragalus, ginseng, and ginger have been widely used in practical medicine. [1, 2] Preparations made from these plants are widely used to increase physical and mental performance in athletes and people engaged in mental labor, as well as in the complex treatment and medical rehabilitation of weakened patients. [3] Adaptogens regulate the production and consumption of energy in the cells of muscles, liver, kidneys, brain, and other organs. They have an antioxidant effect and reduce the damage caused by free radicals. They also prevent hypoxia, which almost always accompanies intensive physical work, and with the participation of these mechanisms, microcirculation in the vessels of the brain and working muscles improves by improving the rheological properties of the blood.

Keywords: physical endurance, adaptogen, white mice, tincture, Adaptofit

Tribulus terrestris grows mainly in the dry steppes of southern Russia and the CIS countries (lower reaches of the Don and Volga, Ukraine, Moldova), as well as in the semi-deserts of Central Asia, Kazakhstan, the Caucasus, Altai and Eastern Siberia (Dauria). The plants are especially widespread in the Surkhandarya, Samarkand and Kashkadarya regions of Uzbekistan, the Kurgan-Tepa and Kulob regions of Tajikistan, the Shymkent region of Kazakhstan and the central regions of the Republic of Tuva. In Tuva, as in other regions of Siberia and Dagestan, Tribulus terrestris grows mainly on sandy soils, densely covered with pastures, on roadsides and in the steppe belt. The plant contains saponins, flavonoids, alkaloids, polysaccharides, glycosides, sterols and tannins. [4,5].

One of the most important tasks of modern pharmacology remains the search for adaptogenic drugs for gradual use in the complex treatment of weakened patients during the period of medical rehabilitation. Therefore, the development and introduction into practical medicine of new drugs with high adaptogenic activity and minimal side effects remains relevant.

Research Objectives . Based on the above data, the aim of this study was to evaluate the physical endurance of Adaptofit in the forced swimming test with a load. Eleutherococcus (Eleutherococcus senticosus) liquid extract (OAO "DALKHIMFARM") was used as a comparator drug.

Materials and methods. Forced swimming. The classic Porsolt forced swimming test is designed to assess endurance and performance under stress. For this, a load (optimally, according to our calculations, 5-10% of the animal's body weight) is attached to the hind legs of the animal.

The experiments were conducted on white, outbred male mice weighing 18–21 grams. They were housed in a laboratory vivarium for two weeks prior to the start of the experiment, with free access to water, a 12-hour light cycle, and 6 per cage.

Work with experimental animals was carried out in accordance with the requirements of the Pharmacological Committee of the Republic of Uzbekistan, as well as the rules of the European Convention for the Protection of Vertebrate Animals used for Experimental and Other Scientific Purposes. The effect of the drug on general physical endurance was determined in white mice in a pool with a water temperature of 27 ± 0.5 C. To reduce the variability of the results obtained, a load equal to 7% of the body weight was attached to the tip of the tail of each white mouse, which did not interfere with the movements of the animal. The animals were previously trained to swim for 3 days. The duration of swimming was recorded in seconds. The duration of swimming until complete exhaustion was assessed, the criterion for which was immersion of the animal in water for 5 seconds [6]. A tincture was prepared from the aerial parts of Tribulus terrestris and dry extract of ginger (Zingiber officinale) in accordance with the ratio 1:5 specified in the State Pharmacopoeia 11. The study tincture was administered intragastrically to animals, once and several times (over 7 days), 45 minutes before placement in the pool at doses of 15 ml/kg and 25 ml/kg. Animals in the comparison group were given a liquid extract (suspension) of alcohol-diluted Eleutherococcus senticosus extract in a volume of 5 ml/kg. The control group was given an equal volume of distilled water. Statistical analysis was performed using standard methods using the Student t-test. Differences were considered significant at a 95% probability ($P < 0.05$).

To assess the physical performance of mice, a full-exhaustion swim test with a load of 5-10% of body weight was used [4]. A weight weighing 0.1 g was attached to the base of the tail of the animals and weighed to the nearest 0.2 g. The mice were placed in a glass cylinder (27 ± 0.5°C) with a small amount of detergent to prevent air bubbles in the fur and to completely wet it. Physical performance was assessed by the time the mouse swam from the moment of being placed in water until complete exhaustion (dive to the bottom), the time of stable swimming while breathing on the surface of the water, and the time of swimming movements while fully immersed in water.

Results and discussion. Analysis of the results showed that Tribulus terrestris increased the fertility of test animals by 1.2-1.5 times compared to the control group at single doses of 10 ml/kg and 15 ml/kg, respectively. However, this increase was not statistically significant. A dose of 20 ml/kg also increased the swimming time of white mice by 1.5 times. At the same time, the increase in fertility for the comparator Eleutherococcus senticosus was 1.6 times higher than for the control group. In addition, the Adaptofit test tincture and the comparator Eleutherococcus senticosus caused a similar increase in swimming time in white mice compared to the control group (Table 1).

In another series of experiments with repeated prophylactic administration of the above doses for 7 days, daily administration of Adaptofit tincture increased swimming time compared to control animals at doses of 15 ml/kg and 20 ml/kg, respectively. Under these conditions, the comparator drug Eleutherococcus senticosus had a 98% stimulating effect on the general physical endurance of white mice (Table 1).

Thus, the studied Adaptophyte tincture based on tribulus terrestris and ginger (Zingiber officinale) and eleutherococcus senticosus had approximately the same effect in increasing the swimming time of white mice.

Effect of different doses of Adaptofit on swimming time after single and multiple administration in white mice (M±m, n=6)

Table 1

No.	Study drugs and their dosages	Swimming duration (min.)		Effect on overall physical endurance, in%
		Once applied	When used many times	
1	Control	1 8 , 7 ± 1 , 1	19.8 ± 1.3	-
3	A daptophyte 15 ml/kg	27.4 ± 1.2 *	34 , 9 ± 1,1 *	46-76%
4	A daptophyte 20 ml/kg	3 4 .7 ± 1 .1 *	3 9.3 ± 1.1 *	85-98%
5	Eleutherococcus 5 ml/kg	3 6 , 5 ± 1 , 3 *	4 2.3 ± 1.3 *	95%-113%

Note: * - significance of differences compared to the control group ($P < 0.05$).

Conclusion. Adaptofit tincture at a dose of 20 ml/kg significantly increased the general physical endurance of animals, increased the resistance of white mice to the effects of extreme swimming time. Prophylactic administration of Adaptofit tincture at a dose of 20 ml/kg for 7 days caused significant adaptogenic activity. Iron thorn (Tribulus terrestris) is comparable in its adaptogenic effect to Eleutherococcus senticosus, which increases performance during intensive physical exercise and prevents fatigue.

References:

1.Panossian A., Wikman G. Effects of adaptogens on the central nervous system and the molecular mechanisms associated with their stress-protective activity // Pharmaceuticals . - 2010. - Vol. 3. – P. 188–224.

2.Brekhman II, Dardymov IV New substances of plant origin which increase nonspecific resistance // Annual Review of Pharmacology . - 1969. - Vol. 9. – P. 419–430.

3.Bucci LR Selected herbals and human exercise performance // The American Journal of Clinical Nutrition . - 2000. - Vol. 72. – P. 624S–636S.

4.Ganzera M., Bedir E., Khan IA Determination of steroidal saponins in Tribulus terrestris by HPLC // Journal of Pharmaceutical Sciences . - 2001. - Vol. 90. – P. 1752–1758.

5.Chevalier. A. Encyclopedia of Herbal Medicine . – London: DK Publishing, 2016. – 336 p..