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USE OF APILAK (ROYAL JELLY) IN SPORTS MEDICINE

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Sports activities place high demands on the human body. According to current ideas, it is not possible to achieve good results in sport without a high level of training stress. It is known that sportsmen are frequently exposed to adverse factors, such as a change in the regime of work and rest, nervous and emotional overstrain, changes in time and climatic zones, *etc.*

It has also been established in recent years that during training and competition, the action of stress against an increased nervous and emotional background causes the body to lose considerable amounts of water, minerals and vitamins [11]. Moreover, the changes in the sportsman's body may sometimes exceed the "physiological norm" and may lead to pathological states. Therefore, it is reasonable to introduce into sports practice a combination of prophylactic measures aimed at the preservation of health and the maintenance of a high level of physical work capacity among sportsmen, especially during the autumn–spring period and immediately before competitions. At the Irkutsk Medical Rehabilitation Center great importance is attached to methods of increasing nonspecific resistance in the sportsman's body, as well as various prophylactic measures. To increase nonspecific resistance we have used royal jelly from bees, lyophilized at the Kolos factory in Moscow and supplied under the name "Apilak." Royal jelly has positive effects on the human body, as confirmed by many experiments in humans and animals.

A total of 22 amino acids have been detected in the protein fraction of royal jelly, and it is therefore a biologically active and high quality source of nutrition. Apilak contains a large number of macro and microelements—iron, magnesium, calcium, cobalt, phosphorus, *etc.* Cobalt, being a component of vitamin B₁₂, actively participates in the protein metabolism of the body [4, 5, 7]. According to the data of several authors [1, 6, 8, 9], the therapeutic effect of royal jelly is associated with an increase in the activity of lymphoid tissue, and also with the activation of the pituitary-adrenal system. This results in increased production of adrenocorticotropin (ACTH) in the pituitary, which in turn causes an increase in 17-ketosteroids and amino acids in the blood, the latter improving liver function and promoting the synthesis of protein hormones.

Yugoslav scientists have experimentally demonstrated an increase in the endurance of mice and rats subjected to a swimming test following intake of apicomplex (royal jelly) [9].

We wished to study the effect of Apilak on physical work capacity, the recovery processes in sportsmen, and the resistance of the body during a period of high physical stress. Ten "light class" athletes aged between 18 and 23 years (all men) were investigated at the

Medical Rehabilitation Centre of the Voluntary Sports Society (Road Construction Division) "Locomotiv" base. To determine the indices of physical work capacity we used the PWC_{170} test (according to V. L. Karpman's 1974 formula), carried out on a Monarch bicycle ergometer. In assessing the results the level of stressing was taken into account, and the functional state of the cardio-vascular system was monitored, using the frequency of cardiac contractions (FCC), arterial pressure (AP), electrocardiogram (ECG), interval cardiogram (ICG), and phase analysis of systole of the left ventricle with assessment of contractility of the myocardium, all combined in a points system.

Before administration of royal jelly, in the group investigated the mean index of the physical work capacity from PWC_{170} was 1437.4 ± 62.3 kg/min, the mean rating of the contractility of the myocardium was 23.7, which is considered satisfactory, and interval cardiography $\Delta R - R_{cp} = 0.27$ s. The majority of sportsmen complained of unsettled mood, decrease in work capacity, rapid fatigue, disturbed sleep and poor appetite. Taking into account the subjective and objective initial data, we included in their rehabilitation regime royal jelly at a dose of 0.2 g twice daily, under the tongue, for 15 days. Large doses of this preparation are appropriate and work has indicated that for therapeutic purposes the content of the main components of royal jelly should be considerably increased. A preparation has now been developed, "Alifortil," in which the dose of the main components of Apilak has been increased 1000-fold.

Literature data are available reporting that royal jelly should not be stored in honey because the action of enzymes in both honey and royal jelly change its composition and destroy its therapeutic properties. It is also not recommended to take Apilak internally as the gastric juice inactivates its therapeutic properties. If taken sublingually, however, this preparation is well absorbed by the mucose and is rapidly distributed throughout the body via the bloodstream [4, 8].

During the period of Apilak administration, training was as a rule carried out in the aerobic direction. One month after administration began we made the same tests on all athletes under investigation as at the start of the experiment. We established a considerable increase in the PWC_{170} indices, amounting on average to 1755 ± 66.76 kg/min ($p < 0.05$), an improvement in the contractility of the myocardium—on average 30.4 points (good)—and positive changes in the interval cardiogram— $\Delta R - R_{cp} = 0.31$ s.

It should be mentioned that during administration no-one showed habituation or allergy to the relatively large doses of royal jelly. On the contrary after several days the athletes reported a general stimulation and improvement in wellbeing. On the third to fourth day their emotional state was normalized, and sleep and appetite were restored. The maximum positive effect was observed on the seventh to twelfth day after Apilak intake and continued for 15 days. Subsequent administration of royal jelly at the dose mentioned showed no further stimulating nor inhibiting action on the body. Therefore an interval of 20–30 days between courses is necessary.

In the 1970s the therapeutic and prophylactic properties of an alcoholic emulsion of royal jelly were tested repeatedly in the treatment of influenza. Many authors believe that royal jelly increases the defence mechanisms of the body [3, 7].

The action of Apilak was studied over 2 years using 18 "light" athletes of the Voluntary Sports Society (Road Construction Division) at "Locomotiv" (Irkutsk). The control group consisted of 10 volunteers who did not take part in any sport. Investigation of the state of nonspecific resistance of the body during the $1\frac{1}{2}$ –2 weeks before competitions and during the autumn-spring period showed that all these athletes to a greater or lesser extent showed a

decrease in plasma lysozyme (mean content $0.12 \pm 0.04 \mu\text{mol/liter}$, control $0.28 \pm 0.03 \mu\text{mol/liter}$) and in the phagocytic activity of blood leukocytes (percentage phagocytosis $41.4 \pm 4.2\%$, control $69.4 \pm 1.2\%$; phagocytotic index 8.9 ± 0.79 , control 14.3 ± 0.5). The immunoresistance of the body can be judged from these indices [2, 10].

After taking a course of royal jelly, the activity of lysozyme in the blood serum of the sportsmen increased markedly up to $0.38 \pm 0.06 \mu\text{mol/liter}$ as did the phagocytic activity of blood leukocytes (percentage of phagocytosis up to $70.4 \pm 1.4\%$, phagocytotic index up to 15.1 ± 0.49).

On the basis of the data obtained we can therefore recommend the administration of royal jelly at the doses mentioned (0.2–0.4 g) at an appropriate time, on its own or together with other agents, in order to improve the nonspecific resistance of the body and also the physical work capacity and recovery of sportsmen.

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