Overtraining, or staleness, is a state when standard training regimes become extremely difficult and previous performance results are no longer possible. The American Medical Association defines staleness (slump) as a psychological or physiological state of overtraining which manifests itself as deteriorated athletic readiness. Various experts in the field define overtraining as: a special neurotic state, a commonest and least understood illness, stress syndrome, chronic fatigue, etc.

This syndrome was first described by McKenzie (1923) as a condition he called staleness or overtraining. He wrote that overtraining is above all “poisoning of the nervous system”. Among the objective findings, described by McKenzie, were low blood pressure, gradual loss of weight and a variation in heart rate of more than 20 beats between the lying and standing positions. The recovery from this syndrome may be a matter of weeks or even months, stated McKenzie.

It is worth mentioning that there are few research investigations in this field, and from these have come many controversial findings causing the problem to be rather obscure.

Athletes train regularly with increasing amount and intensity of work, in the training sessions, in an attempt to achieve the best possible results. The development of “sports form”, a final high level of training, is related to the positive changes their bodies have undergone. If the requirement of the training and the total amount of effort in everyday life are in accordance with the abilities of the athlete, a normal development of « sports form » will occur and the athlete will attain good results, thus gradually improving his performance in competitions. If, however, the total amount and intensity of the effort surpass the body’s abilities, a progressive fatigue occurs which leads to decreased athletic performance. There were many cases in which performance failed to progress in spite of uninterrupted training. The athlete tried his best but without any success. In these cases the athlete may begin to voice some symptomatology. These are signs of overtraining.

Many symptoms have been attributed to this problem. These symptoms may be divided into 3 groups: 1. Complaints in the nervous system marked by emotional and motivational inbalance such as: unusual irritability or apathy, decreased self-confidence, aversion to training or even to places of training, avoidance of training and competitions, exaggeration of the negative influence of external factors such as poor weather or equipment, disturbed sleep, loss of appetite, decreased drive, slump in morale, feeling of boredom; 2. Complaints of impaired motor ability such as: slower and less precise movements, lack of strength and stability of the movements, decreased dynamic coordination, and inability to relax. There is difficulty in carrying out a normal training
program with a longer time than usual required for recovery from exercise. Previous performance levels are no longer attainable; 3. Complaints concerning the different organ systems such as: palpitations and chest pain, pain under the rib cage, heavy legs, general discomfort, disorders of the gastrointestinal tract, weight loss, increased sweating and increased illness and injury. Disturbances in the menstrual cycle may also appear.

The medical findings in overtraining are of questionable significance. Resting heart rate, blood pressure, blood glucose level, and white blood count were found to be elevated by some researchers and unchanged by others. Researchers found the cardiopulmonary system to be working inefficiently at rest and during submaximal exercise with increased oxygen demand and oxygen debt, increased latent period of the motor movement, increased time to muscle relaxation and impaired action of antagonist muscles. Vitamin deficiencies and impaired immunological status have also been found. In some athletes, generalised lymph node swelling appeared, allergies worsened, flu or respiratory infections occurred more frequently. Others suffered from diarrhea or constipation. There are also reports of hypertensive blood pressure response to graded exercise, negative nitrogen balance and ECG changes similar to those found in coronary patients.

Few investigations have been carried out to examine biochemical changes in overtraining. Some found the oxydative processes in the muscle to be deteriorated. They found a decreased level of glutation and ascorbic acid in the muscle and thereafter decreased glycolytic processes and decreased glycogen concentration. The resynthesis of ATP was slown and the recovery after exercise protracted. The adrenylic acid was disamin-ated easily and as a result much amonia was concentrated in the muscle. These investigators emphasised that the work performance of overtrained athletes is less economic and, for a standard work load, the energy cost is higher. They claim this to be the basis for deterioration of the fitness level and decreased performance in competitions. Others recommended further hard training sessions only if after 8-12 hours of night rest the enzyme activities, notable CPK, returned to the normal range. They claimed that, following this formula, overtraining can be avoided.

Most investigators have emphasised the fact that many predisposing factors may cause overtraining. The main factor for overtraining is undoubtedly improper training and inadequate recuperation after the training sessions. Even with an appropriate amount and intensity of training, overtraining may occur if one or more of the following predisposing factors are present: monotony of training, continuous camp training, (training away from family and friends), inappropriate nutrition, lack of sleep, bioclimatic factors, unsuitable lifestyle, mental conflict situations, occupational overload, infections and use of illicit or harmful drugs.

Most experts described the development of the overtraining syndrome in three stages:

Stage 1: The performance level does not continue to increase, however, there may be no deterioration. There are many subjective signs such as nervousness, lack of interest in training, sleeplessness.

Stage 2: Most of the objective findings and complaints mentioned above appear and there is a clear decrease in performance.
Stage 3: A full development of all symptoms. In the third stage many of the previously described signs and symptoms may appear.

Some scientists describe an acute and a chronic form of overtraining each with specific symptoms, or as a Basedowian form and Adisonian form in which the symptoms are similar to those of hyperfunction of the thyroid gland or hypofunction of the adrenal glands. It has also been held that mental unrest and anxiety can bring about the condition. Some view it as a typical physiological and medical problem.

There are some important factors to consider in preventing the disorder. Coordination of the amount and intensity of the exercise, with a suitable recovery period after the training sessions, are essential. Most specialists propose the following preventive measures:

1. A well-dosed training, suitable to the fitness level of the athlete. Avoidance of excessive or inappropriate demands.
2. Reasonable performance (competitive) demands.
3. Sufficient sleep and recreation.
4. Appropriate nutrition - quality and quantity.
5. Avoidance of stimulants, abstinence from tobacco and alcohol.
7. Maintenance of mental balance, solving of psychic conflicts.
8. Regular examination by a sports physician and, if necessary, a psychologist.

The treatment of overtraining is a matter of a few weeks in the first stage and maybe a matter of months when it reaches stage two or three. Most specialists agree that all causative factors must be avoided and suggest caution against sudden discontinuation of training. Participation in regular training or competition is restricted and only leisure activities are recommended. Complete rest may lead to disturbances in the autonomic nervous system. An alkaloetic form of nutrition is recommended (fruits and vegetables) to regulate the acidotic tendency of metabolism. Some authors recommend hydrotherapy and massage. Others propose mild sedatives. For the Adisonian type of overtraining, which is a very rare finding, mild stimulants or even hormonal therapy is recommended.

The prognosis for the overtrained sportsmen is good. After a few weeks, or in some cases months, a full restoration should occur and the athletes may return to regular training. There is no evidence of irreversible damages to the internal organs.

In spite of all symptoms, it is surprising that many scientists make no mention of this special condition. Many books on sports medicine and physiology of exercise do not even touch upon this topic, while others dispense with it in a few words. There are experts that believe that such a condition does not exist. For them, the word overtraining is simply a great amount of work in the training sessions. On the other hand, in all Russian literature on medical control of athletes or physiology of exercise, at least a full chapter is always devoted to overtraining.

The diagnosis of overtraining is not easy. Many specialists emphasised the fact that in most of the athletes a few symptoms appeared which are not specific for overtraining (nervousness, disturbances in sleep, feeling of fatigue, loss of appetite, etc.). Obviously these
athletes were in the first stage of overtraining. There are many difficulties in assessing the objective findings. Some have found increased heart rate, blood pressure, blood sugar level and white blood cells. Others found decrease in these parameters. In some athletes only gastrointestinal disturbances appeared, in others palpitations, chest pain or ECG changes were prevalent.

In conclusion, the whole concept of overtraining needs serious scientific reappraisal. Differences in symptomatology, objective findings, stages of development, forms of overtraining, all need further investigations.

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