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PROPER NUTRITION OF ATHLETES, MARTIAL ARTS

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Annotation
The role of nutrition for athletes is considered. Attention is focused on the importance of proper nutrition. The nutrition of single combat athletes is considered. The nutritional requirements that an athlete must fulfill in order to achieve high performance in sports. Not every diet can be considered normal for maintaining the body. It is important to observe the daily calorie intake depending on the type of activity, physical activity, lifestyle and body characteristics.

Keywords: nutrition, athletes, health, food, martial arts, physical activity, training process.

Nutrition is the basis for the rational construction of the training process, maintaining a high physical shape, activating recovery processes, and increasing neuro-emotional stability. For performance, optimal physical condition, endurance, a healthy diet is necessary.

Modern nutrition of athletes is based on the principles of rational nutrition and the characteristics of muscle activity during the training process. Sports also differ in terms of nutrition[3,19].

The development of sports around the world has led to the emergence and development of many individual sports, of which there are currently more than 200. The classification of sports is divided into six groups:

Group 1 - cyclic sports (cross-country athletics, swimming, rowing, cycling, skiing, speed skating, etc.)

Group 2 - speed-strength sports (track and field sports, throwing, sprint program numbers in various sports).

Group 3 - complex coordination sports (sports and rhythmic gymnastics, figure skating, diving, etc.).

Group 4 - martial arts (all types of wrestling and boxing).

Group 5 - sports games (football, hockey, volleyball, etc.).

Group 6 - all-around (cross-country skiing, athletics decathlon, modern pentathlon, etc.).

The main types of martial arts include:

- Percussion types (focus on hitting the opponent with different parts of your body) - boxing, karate, taekwondo and kickboxing.
- Wrestling (main focus on grappling, choking, joint control and disarticulation) - all types of wrestling (freestyle, Greco-Roman), judo, aikido, etc[12].

As you know, a characteristic feature of martial arts is the expenditure of energy at a non-constant, cyclic level of physical activity, depending on the specific conditions of the competition and sometimes reaching very high intensity.

The specificity of their sports activity is of a phase nature and consists in the rapid restructuring of motor actions corresponding to the changing situation. Martial arts, according to the type of energy supply, belongs to the speed-strength group, with powerful "explosive" movements and static stress at the limit of power capabilities. Most fully these sports develop strength, speed, endurance [12].

The main task of nutrition is the optimal and timely replenishment of energy costs, as well as plastic and biologically active substances that are actively consumed in the process of intense muscle activity, so the nutrition of athletes should be clearly differentiated depending on the type of sport and the stage of training of the athlete [2-4].

The relationship between the strength and speed of muscle contractions allows you to determine the basic principles of strength training, which causes changes in hormonal levels (release of growth hormone, testosterone, corticosteroids, cortisol). Along with this, the training process is accompanied by an intensification of the processes of lipid peroxidation and endogenous intoxication [1].

When developing nutrition principles for martial artists, it is necessary to take into account that their nutritional needs depend on the size and composition of the body, gender, age, individual characteristics, metabolic characteristics associated with genetic factors, the period of sports activity (training, competition, recovery), duration and intensity. physical activity, as well as environmental conditions [2-5].

The diets used by athletes during training activities and competitions, as well as during the recovery period, do not always provide the body's needs for energy, macro- and micronutrients [5,6]. Thus, in the diets of elite basketball players, a lack of vitamin A and niacin was noted [7]. At the same time, there is no doubt that the consumption of macro- and micronutrients in elite athletes should fully meet their needs [8-11].

One of the most important conditions for the work of muscles is to provide them with energy. It is known that the reserves of adenosine triphosphate (ATP) of the muscles

are depleted in a few seconds during intense physical work. Three types of anaerobic (creatine kinase or alactate; glycolytic or lactate; myokinase) and aerobic mitochondrial mechanisms function for ATP resynthesis in human skeletal muscles [20, 24].

It is believed that up to three minutes of energy costs are covered mainly by anaerobic mechanisms - ATP-CP (creatine phosphate) and glycolysis. In this case, glycolysis gives maximum power for about 3 minutes after the start of work, and then several different mechanisms coexist simultaneously. But with loads lasting more than 10 minutes, the aerobic mechanism becomes the main source of energy [8].

Physical work of low and moderate intensity (<60% of maximum oxygen consumption) is provided with energy due to aerobic oxidation of free fatty acids. With more intense work, carbohydrates become the predominant source of energy, which provide energy for physical activity with an intensity of 85-90% of the maximum oxygen consumption. The most important factor that ensures the adaptation of the athlete's body to the load is nutrition. The recent changes in the conditions for holding competitions (for example, a decrease in the number of weight categories of wrestlers with a weight limit in the heavy weight category up to 120 kg) predetermine the development of new adequate and balanced diets in order to increase general and special performance, the effectiveness of adaptation to intense physical and psychological loads, optimization of post-load recovery processes, dynamic correction of the functional state, prevention and treatment of pathological conditions associated with sports [14,15].

Examinations of martial artists revealed nutritional disorders associated with an excess of calorie content of the diet due to excessive consumption of saturated fat, added salt and sugar, and against the background of insufficient intake of omega 3 polyunsaturated fatty acids (PUFAs), dietary fiber, B vitamins, calcium and magnesium with the diet [16-18].

Building a diet of a martial artist with full replenishment of the need for energy, macro- and microcomponents, biologically active substances and maintaining the body's water balance is an important requirement in organizing the training process. The basic principles of nutrition for combatants [14,15,19-21]:

- Receipt of the amount of energy corresponding to its high consumption in the process of physical activity;
- Compliance with the principles of optimal nutrition in relation to the intensity of the loads;
- The choice of adequate forms of nutrition, taking into account the mode of training and competition;

- The use of nutrition to ensure the increase or decrease in body weight;
- The use of nutrients to activate physiological processes (aerobic and anaerobic oxidation, myoglobin accumulation, optimize the function of the immune system, etc.) and create a metabolic background that is beneficial for the biosynthesis of humoral regulators and the implementation of their activities.

The daily amount of energy received from food should fully cover the body's energy costs, which are usually expressed in kilocalories (kcal). In the same units, the energy value of food is indicated.

Energy needs of a person depend on factors such as body size, body composition, movement efficiency, goals and energy expenditure for training.

Nutrients are generally divided into five different categories: carbohydrates, proteins, fats, vitamins, and minerals.

Protein is essential for repairing damaged body tissues and creating new proteins in response to a training stimulus [18,19]. Endurance athletes doing hard workouts may need extra protein as well as post-workout recovery. Negative energy balance and inadequate carbohydrate intake during heavy workouts can also increase protein requirements. There is evidence to suggest that the greatest increase in protein requirements occurs primarily in the early stages of a new exercise program or a new level of exercise (eg, when changing the type, volume, or intensity of training). However, once the body adapts to this stress, the protein requirement can be reduced to a more modest level. Protein comes from a variety of sources such as beef, chicken, eggs, milk, cheese, etc. Some high carbohydrate foods are also good sources of protein. Protein requirements are easily met by eating a varied diet based on nutrient-dense foods.

The main sources of energy for combatants are carbohydrates and fats. When consuming a high-carbohydrate diet, the contribution of glycogen to energy supply increases, and a high-fat diet increases the contribution of fatty acid oxidation.

Carbohydrates remain a key nutrient for athletes. It provides the main fuel for exercise, especially during long continuous exercise or high intensity work. The body has a limited ability to store carbohydrates (as glycogen in the muscles and liver), and the stores need to be regularly replenished to support training [24]. About 300-500 g of glycogen is stored in the muscles and 75-100 g in the liver. This amount of carbohydrates is enough to run about 20 miles at a moderate intensity [19].

However, carbohydrate requirements are greatly influenced by training loads (frequency, duration, and intensity of training) and competition requirements. With this in mind, daily carbohydrate intake should reflect daily exercise levels [23-25].

Low carbohydrate stores in the body can lead to fatigue, poor performance during training or competition, and adversely affect immune function.

In contrast to carbohydrate reserves, human fat reserves are large and are considered virtually unlimited. Fat stores are primarily located in adipose tissue, but significant amounts also exist as intramuscular triacylglycerols, which can serve as an important fuel during exercise [24]. Carbohydrates and fats are always oxidized as a mixture, and the relative contribution of these two substrates depends on exercise intensity and duration, aerobic fitness level, diet, and carbohydrate intake before and during exercise.

In absolute terms, fat oxidation increases as exercise intensity increases from low to moderate intensity, even though fat percentage may actually decrease [20,24].

Vitamins and minerals are required by the body for several important processes, including the growth and repair of body tissues, as cofactors in enzyme-catalyzed metabolic reactions, for oxygen transport and oxidative metabolism, for immune function, and as antioxidants[10]. Any sustained deficiency of an essential vitamin or mineral will result in poor health, and an unhealthy athlete is extremely unlikely to reach their full potential.

Vitamins are organic compounds that are needed in the diet in very small amounts. Although physical activity may increase the requirement for some vitamins (eg, vitamin C, riboflavin, and possibly pyridoxine, vitamin A, and vitamin E), this increased requirement is usually met by a balanced, high-carbohydrate, moderate-protein, low-fat diet. Some vitamins act as antioxidants. Evidence suggests that antioxidants provide an important defense mechanism of the body against the damaging effects of free radicals [20,21]. Many athletes consume high doses of antioxidant vitamins (vitamins A, C, and E), but excessive intake of antioxidants can be harmful to the body.

In nutrition, the term "mineral" usually refers to those components of food that are essential for life processes. Minerals are classified as macrominerals or microminerals (micro and microelements) depending on the degree of their presence in the body and the amount required in the diet [18,19]. Appropriate dietary intake of minerals is essential for optimal health and physical performance. Some minerals (such as calcium and phosphorus) are the building blocks for body tissues, including bones and teeth. A number of minerals (eg magnesium, copper and zinc) are essential for the normal function of enzymes involved in the regulation of metabolism, and some minerals (eg iron and zinc) play an essential role in the functioning of the immune system [18].

Regular exercise, especially in hot weather, leads to increased loss of some minerals in sweat and urine, which means that hard training athletes have an increased daily requirement for most minerals. However, with the exception of iron and zinc, isolated mineral deficiencies are rare [24].

A key priority for athletes is to create a well-tailored training diet that can be easily manipulated when special situations arise (e.g., changing training load, changing body composition targets, or special competition needs) [19,24]. A good basic diet will provide enough nutrients and energy to improve training adaptation, support optimal recovery, and prevent excessive exercise-related stress. Hard training and competition increase the need for nutrients, especially carbohydrates, proteins, water and electrolytes, depending on the sport. The following section focuses on the nutritional strategies adopted by athletes before, during and after training, depending on the type of activity.

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