

Principles of Nutrition in Sports Training

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Abstract:

Proper nutrition is critical for athletes to maintain their health and optimize their performance. It has also a major impact on athletic performance. The aim of this paper is to discuss the basic principles of nutrition in sports training and health training. The size, composition and times of meals may have a huge impact on sports performance. Good dietary practices allow athletes to train hard, regenerate quickly, adapt better, while reducing the risk of illness and injury. Athletes should use appropriate nutritional strategies before and after their performances, so as to achieve the best results. They should pay special attention to the amounts of macronutrients (carbohydrates, protein, and fat) and micronutrients (vitamins and minerals) carbohydrates, proteins, fats, vitamins, minerals in their food, as well as the amount of consumed fluids.

Keywords: Training, Sports, Nutrition, carbohydrates, proteins, fats, vitamins, minerals

Introduction:

Sports Training and Health Training

Sports training is a long-term, specially organized pedagogical process, in which athletes learn the techniques and tactics of their discipline and perfect them, developing physical fitness, as well as volitional qualities and personality, and acquire knowledge of their discipline. The aim of a training is to optimize body functions and develop specific adaptation to physical effort in order to obtain maximum results and achievements in a sports discipline. Adaptation is the ability to adapt to various environmental conditions. One can mention genotypic adaptation (appearance of anatomical and physiological changes in the gene pool, which are handed down from generation to generation) or phenotypic adaptation (physiological responses to direct environmental stimuli). Health training is a conscious and systematically physical activity taken up to maintain health and prevent many diseases. What distinguishes health trainings from spontaneous (and often irrational) physical activity, is respect for fundamental principles which determine efficacy and safety of trainings. Proper nutrition plays an important role in both sports training and health training. The aim of this paper is to present and assess principles of nutrition in sports training and health training.

Principles of Good Nutrition: Rational nutrition (diet) – is food intake in line with nutritional recommendations, which takes into account genetic, social and cultural predispositions. Rational nutrition, which can be also labelled ‘optimum’, ‘proper’ or ‘healthy’ diet, meets biological, psychological and social needs; allows to achieve full, genetically programmed physical and mental development; maintain body’s resistance to diseases and fitness until old age. It should be highlighted that proper nutrition is a decisive factor of growth and development of a young organism. It also greatly impacts athletic performance. Young athletes deprived of adequate energy substances or proper hydration may experience reduced strength, speed, endurance, concentration, and increased fatigue. Risk of injury also increases. Nutrition is not given as much importance as is given to sports results. Proper nutrition of athletes helps them practice their sports discipline. To achieve this, young athletes should know what to eat, why to eat it, when and in what quantity. Based on the position (confirmed by numerous scientific studies), of the International Olympic Committee, the American Dietetic Association, Dieticians of Canada and the American College of Sports Medicine – the Polish Society of Sports Medicine presents sports doctors, trainers, nutritionists and athletes with recommended dietary rules. Suitable composition and times of meals

before, during and after workout in a form of an individual nutritional strategy ensures optimum storage of energy resources in the body, its hydration and consequently less challenging workout sessions, quicker recovery time after strenuous workout or competition, and reduced risk of illness or injury. Athlete's diet consists of varied and properly composed meals, containing the right amount of essential nutrients (carbohydrates, proteins and fats), vitamins and micro elements contained in natural foods.

Athlete's Nutrition in Endurance Training

The main element of endurance training is long-term work out of uniform intensity. Endurance – i.e. the ability to withstand such effort – depends on the accumulated energy reserves in the form of glycogen and free fatty acids, which serve as main sources of energy. To achieve success in endurance disciplines, a high carbohydrate diet is required. Energy needs of endurance athletes include: body weight, energy expenditure during workout, frequency of competitions, and nonsupport activity. In some endurance disciplines, energy demand may reach even 10,000 kcal per day. Such demand may result in problems with consumption of the amount of food necessary to cover it.

The recommended regimen of caloric intake by nutrients: — Carbohydrates: 6–8 grams / kg of body weight / day — Protein: 1.2–1.8 grams / kg of body weight / day — Fats: 1 gram / kg of body weight / day.

When planning the menu, one should consider the appropriate amount of servings of complex and simple carbohydrates, and adequate supply of proteins and fats in main meals. Ideally, meals should be eaten at short intervals, e.g. every 2 hours. Special attention must be paid to the replenishment of carbohydrates during workout and immediately after its completion. In endurance sports, energy that enables long-term effort is of key importance. The basis of the pyramid of a well-balanced diet for endurance athletes are carbohydrates (6 to 10 servings a day); they should come from rice, grains, pasta, whole-grain bread, cereals, fruits and natural juices. They are a source of carbohydrates, B vitamins, fibre and other necessary components, and do not contain a lot of fat. Daily delivery of

carbohydrates with a low glycaemic index makes it possible to maintain glycogen reserves at the right level.

Strength Training and Strength/Speed Training

A typical diet used in strength sports, where maximum muscle growth and maintaining low fat is priority, tends to include substantially increased protein intake. According to US standards, protein needs of an adult with sedentary lifestyle is about 0.8 g/kg of body weight. Strength sports athletes believe that a significant increase in protein intake (up to 2.8 g/kg) results in higher increase in muscle mass, compared with lower intake (about 1.4 g/kg), which has been shown in some studies. These results have not been confirmed, therefore the recommend daily intake is 1.2–1.7 g/kg of body weight. Diet in strength/speed sports, such as martial arts and team sports, should have protein content increased only by about 15%, compared to the basic standards. Amino acids are not stored, and excessive consumption would cause an unnecessary strain on the system (liver, kidneys). Good sources of protein are foods rich in animal protein: meat, fish, dairy products and protein supplements. Apart from protein, other necessary nutrients play a significant role. The diet should be well-balanced and contain all the necessary ingredients in sufficient quantities, including vitamins and minerals (macro- and microelements). These components play a role of building blocks and biocatalysts of metabolic reactions in the body.

The Importance of Proper Hydration during Workout

Human body is composed mainly of water. On average, water represents 70% of male and 60% of female body. These differences result from a larger share of body fat in women. Water content in the body decreases with age. Without food, a person is able to survive up to 50 days, with no water – only a few. Water is essential to sustain life; therefore maintaining proper hydration level is an important factor for the proper functioning of the body: both physical and mental. Hydration consists in 25% of intracellular fluids and in 75% of extracellular fluids. The minimum daily demand for water is determined at 1 ml per 1 kcal of food. However, the amount of consumed water depends on several individual factors, such as age, temperature of the environment, humidity, type and frequency of workout.

It should be borne in mind that every day we lose water from the body, and not only with the urine (approx. 1,500 ml), but also through the skin and with breath – up to 700 ml per day, with faeces – approx. 100ml, and further 200ml with sweating (under normal conditions). Higher temperature and more exercise increase these figures and the demand for fluids. It is recommended to drink enough to ensure compensation for the loss of water. Metabolic processes of the body produce about 250 ml of water, while solid foods contain approx. 55% of water. The remaining amount should be supplemented by drinking. Demand for fluids amongst athletes and individuals who train regularly is set at 1.5–2 ml per 1kcal of food. The rate of loss of water from the athlete body depends on: sex, body weight, height, age, fitness level, duration and intensity of workout, climatic conditions (temperature and humidity), and even emotional state. Extracellular fluids are always lost first. As mentioned earlier, athletes lose most of water by perspiration. Micro elements contained in natural foods.

Loss of Water versus Decreased Performance

With one liter of sweat, the body loses 600 kcal of heat energy. In order to prevent excessive sweating during workouts or competitions, it is recommended to, if possible, provide the body with fluids, add salt to dishes, replenish water losses along with other food components (i.e. combining fluid intake with solid food). Excessive loss of water during workout reduces physical performance, and thus – the effectiveness of training. Research indicates that loss of water equal to 5% of the body weight reduces athlete's performance even up to 30%. Loss of water equal to 8–10% of body weight threatens physiological functions of the body, reduces physical and mental fitness, and is even life-threatening.

Hydration versus Workout

The American College of Medicine recommends taking 400–600ml of fluid 2 hours before competition, and 150–350ml every 15–20 minutes during workout. Temperature of fluids should be between 15–22°C. Drinks that are too cold may lead to respiratory infections. After workout, one should consume 150% of fluids lost during training. It is recommended to drink 450–675 ml of fluids for

every half a kilogram of body weight lost during workout or competition.

Conclusions

Proper diet is a very important part of a healthy lifestyle. Dietary guidelines help maintain health and fitness of individuals practicing sports. Proper nutrition helps improve effectiveness of workout and the level of intensity. In trainings for every sports discipline, there are periods of working on endurance, speed and strength. Hence, different sports receive different nutrition guidelines,

- 1) Endurance trainings should be accompanied by more carbohydrates (especially complex); after a long workout, one should choose diet designed to rebuild the consumed glycogen reserves;
- 2) An athlete should consume a meal 2 hours before competition; it should be easy to digest, low in volume, with 60–70% of energy coming from carbohydrates.
- 3) After physical workout, a meal should be easily digestible and contain easily absorbable products.
- 4) Speed trainings require food with high content of digestible phosphorus (e.g. dairy products, lean meat, sea fish, etc.) and should be enriched with nutritious proteins and minerals.
- 5) Strength trainings require proper supply of balanced proteins. Athlete's diet should take into account individual habits and preferences. Unexpected dietary changes may reduce sports performance. Meals should be eaten at fixed times (preferably 5–6 times per day), they should be small in volume and contain easily digestible and high-energy products.

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