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MACRONUTRIENTS AND THEIR IMPORTANCE IN SPORTS TRAINING OF STUDENTS PRACTICING POWERLIFTING

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Abstract. *Nutrition and physical activity are two important factors in a healthy lifestyle, especially for the modern student. Practicing powerlifting in a student environment requires not only sufficient knowledge for a rigorously planned training process, but also for creating a correct diet, rich in food macronutrients.*

Keywords: *nutrition, macronutrients, powerlifting, students.*

Actuality. Following the publication of data by Buciuceanu-Vrabie M. and Pahomii I. in the journal Barometrul Demografic in 2015 [4] one can assess that between 2000 and 2014, in the structure of the 25-year-old population, the number of young people who graduated practically doubled (from 12.4% to 20.1% in 2014). Maintaining the health of young people is greatly influenced by their own behavior and habits, characterized by the consumption of alcohol, tobacco and other substances. At the age of 15-24, 21% of men and 4.3% of women smoke [4].

In their publications, authors Liuşnea C.Ş., Dorgan V. [7] note the negative effects of industrialization such as: hypodinamia, sedentarism and stress on the population health at a global level. In this context, the cause of death of more than 2 million people per year is attributable to malnutrition and lack of physical effort. According to some WHO data from 2008 in the Republic of Moldova, 49.2% of the population is overweight. In Romania, things are not good at this chapter, according to data in 2012, 25-30% of Romanians are obese (which would mean 3.5 million people) and 64% are overweight [7].

Practicing physical activities and sports have beneficial effects on maintaining health and strengthening the body's immune system. Hypodinamia and a lack of balanced nutrition are among the main causes of population general morbidity [9]. According to the WHO's recent prognosis, the morbidity induced by these chronic diseases will account for 57% worldwide in 2020, and the mortality caused by these diseases will increase to 75% of all deaths. Sedentary lifestyle, failure to practice a systematic physical activity and non-homogeneous eating habits can promote obesity in the population [10].

Physical activity in the Republic of Moldova is practiced by only 4-7% of the total population, while in developed economies it is 40-60%. The level of hypodynamia among pupils and students has reached 80% [9].

Lupu L. et al. [8] presents the results of a study in which a large percentage of students of the first year studies at SUMP "Nicolae Testimiţeanu" with depressive symptoms and anxiety show about 44.3% of the total number of 623 subjects. Similar problems are recorded in states like the US - 46.3%, India - 59.3%, Kazakhstan - 93%. The reasons are stress reactions induced by sleep deprivation, diminishinglevels of physical exercise, changes in socialization, and more.

Bîrsan D, Ivanov M. present the results of a study at SUMP "Nicolae Testimiţeanu" on second-year students, which investigated the

impact of glycemia on their anxiety: "People with a high level of general anxiety are characterized by a lower degree of adaptability in the absence of regular food intake, that manifested by an imbalance in blood glucose control mechanisms. The phenomenon is associated with an increase in momentum anxiety that reduces intellectual productivity." Among the reasons for these stressful factors, the authors highlight an inadequate diet [3].

Based on the data above, the need to promote a healthy lifestyle among young people, including young students, is emphasized in terms of practicing a regular physical activity, but also through sensible nutrition that is required for both physical and intellectual efforts.

Aim of the research. Evaluating the importance of nutrition, as part of a healthy lifestyle, and the influence of food macronutrients in practicing powerlifting by students.

Research objectives. Elucidating the importance of nutrition in creating a healthy lifestyle among youth; assessing the value of diet for students practicing sport; the characteristic of the main macronutrients used in the diet of students who practice powerlifting**.**

Methods of research. The theoretical and practical-methodical sources of specialized literature were analyzed in the paper. The solution of the proposed objectives was possible through methods of theoretical research: analysis and synthesis, induction and deduction, idealization, comparison and generalization.

Research results and their analysis. According to Arsene I. [2], physical activity and correct nutrition are important factors for maintaining health, implicitly for the formation of a healthy lifestyle. A healthy, sensible diet plays a special role in maintaining the overall well-being, a high-level work capacity. Inappropriate nutrition puts the body at risk for conditions of cardiovascular, circulatory, endocrine systems, which in combination with hypokinesia, hypodinamia can lead to the development of obesity, diseases of various organs including oncological diseases as well as immune deficiencies [2, 7].

According to Dobrina N.A. [15, p.6-7] qualitative nutrition is extremely important in any sport. Well-balanced food provides the body with enough energy, maintains health, contributes to the development of muscle mass, helps to develop maximum strength and accounts for about 50% of sport performance.

Powerlifting is a physical activity that is characterized by lifting weights and is practiced by students both for health maintenance as well as for sports / competitive activity. A number of researches [11, 12, 13] describe the beneficial effects of practicing this sport in the student environment, namely: maintaining a good physical form, strengthening joints and ligaments, psychological rehabilitation during study hours, development and maintenance of muscular mass, development or improvement of physical fitness, and other benefits.

While practicing this sport, not only do the energy requirements increase, but so do the requirements for all nutrients that enter the organism through food intake. Unless a correct energy balance is established, the body can become lacking in different components, which will act negatively on the organism. It is also important to note that diet influences everything starting with good mood and finishing with important processes of post-effort recovery. Therefore, the powerlifting coach and the athletes of this sport must have enough knowledge to create a proper diet

program that will enhance athletic performance [13, 18].

Niciporco N. et al. notes that high intensity strength training can lead to nutrient depletion in the body. In order to avoid this, it is necessary to compensate all energy costs formed by the body, an action that will increase the recovery process, increase students' body muscle mass through adequate nutrients consumption [18].

Rubanovici V., Friptuleac G., Cebanu S. note that young people who are students have higher demands on energy and nutrient intake than at other stages of the life cycle [9].

According to A. Albu, nutrition is one of the external factors that influence growth and development of children and youth, but its importance is even greater in people who combine studies and sport [1]. At the same time, in combating nutritional errors, the author claims that a sportsman's diet should contain 5 compartments: *Proper hydration* is the first guarantee of performance. *The quantity* of food consumed is essential to ensure an energy supply that needs to be tailored to daily expenses. *Quality* involves primarily adequate protein intake. *Distribution* is food splitting in 4-5 meals a day, and diversity is assuring a variety of products that will fuel your food nutrition needs [1].

The athletic activity of a person is closely related to their physical performance. The latter depends on the volume and capacity of energy sources and their efficient functioning. The energy required for body, system, especially muscle and cardiovascular systems, is produced on the basis of external food sources (nutrients) such as carbohydrates, lipids and proteins, which by means of oxidation is converted into physical or intellectual work [16].

The authors Tomaş G., and C. Eţco are of the opinion that a balanced diet represents a correct and valid correlation between nutritionalbased and biologically active substances - such as proteins, lipids, carbohydrates, vitamins, minerals- in accordance to age, gender, work activity and lifestyle. They also mention that the most important component of food is protein [10]. This concept is supported by other authors as well [1], which suggests that each sport has certain requirements depending on the type, intensity and duration of the effort. Power sports (powerlifting, weightlifting) involve a high protein intake.

Carmen N.N. defines nutrition (from the Latin *nutritio*) as the "total physiological processes by which organisms "acquire" the nutrients needed to grow, develop, obtain energy for vital processes, tissue regeneration, etc." [5, p.4].

Carmen N.N. [5, p.16-20] classifies the main nutrient groups as follows:

1.*Nutrients that provide energy* [5, p.16-20], *which are also called macronutrients* [19]

a. Proteins - 1 g provides 4,1 kcal;

b. Carbohydrates - 1 g provides 4,1kcal;

c. Lipids - 1 g provides 9,3 kcal.

2.Nutrients that do not provide energy [5 p.16-20], *which are also called micronutrients* [19]

a. Minerals:

- Macroelements; Microelements.

b. Vitamins:

- Liposoluble; Hydrosoluble.

According to the authors [1; 5, p.16-20; 6, p.39-42; 19; 20, p.364] proteins are macronutrients that perform extremely important functions in the human body, namely: they represent 75% of the body's solid substances, they play a plastic role, are necessary for the proper functioning of the cells, for ensuring tissue renewal and maintaining hydroelectrolytic equilibrium [5, p.20-23]. Proteins provide energy, restore

body cells, are part of various enzymes, hormones and antibodies [20, p.364], they have a functional role - in metabolic processes, a physicochemical role – due to their amphoteric and colloidal character, proteins participate in regulating osmotic pressure and maintaining acid-base balance [6p.40] and others. But the basic function of these macronutrients in relation to physical activity and strength sports is, however, the maintenance or development of muscular mass [17, p.28], hence called by [1] the "architect" of the body.

Proteins consist of amino acids, 20 in number, which are classified as essential and nonessential. According to the authors [6, p.39-42; 5, p.20-23; 20, p110] essential aminoacids are - histidine, isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan and valine. Other authors [15, p.61-62; 14, p.7,86; 17, p.37-38] assert that essential amino acids are 8 in number. There is no histidine in the above mentioned list, however, it is certain that they cannot be synthesized in the body and enter only through food. Nonessential amino acids can be synthesized in the body [6, p.39-42; 5, p.20-23; 20, p.110].

Proteins are classified according to their biological value, which is determined by the essential amino acid content. Complete proteins, i.e. "high biological value", largely contain the full range of essential amino acids and are found in animal proteins like egg, fish, meat and dairy products. Any protein lacking one or more essential amino acids has a "low biological value" and is part of the incomplete protein found in food of plant origin [5, p.20-23; 6, p.39-42; 19; 14, p.88; 15, p.62-63].

According to the recommendations of some authors, the percentage of proteins in the daily food ration should represent 10% -15% of the total caloric intake [5, p.20-23; 6, p.39-42; 17, p.48]. At the sametime, Anderson J. [20, p.4] recommends 20% for power sports and Dobrina N.A. [15, p.158] suggests 25%.

Carmen N.N. [5, p.20-23] warns that the WHO's recommended minimum intake is 0.52g/kg body weight per day for men and 0.50g / kg body weightper day for women, and the norm is 1.2-1, 5g / kg body weight/day. However, these recommendations are for adults who do not practice sports. Cleiner S. [17p.34] mentions that during muscle growth and strength training it is sufficient to consume 2g/kg bodyweight per day, Dobrina N.A. [15p.158] 2-2.5g / kg bodyweight/day and Batîrev M., Batîreva T [14, p.113] recommends 2.9g / kg bodyweight protein intake for resistance training. In order to assimilate the total amount of protein and avoid using it as energy, it is advisable to allocate the total amount in 5-6 food intakes. For students who practice powerlifting, it is recommended to have an intake of 2.5-2.9g / kg bodyweight / day.

In some authors' opinion [5, p.26-29; 6, p. 27-32; 14 p.8-9; 15, p.85-96; 17, p.58-86; 20, p. 358-368] carbohydrates, are macronutrients that play an important role for people who practice sports activity by maintaining blood glucose levels. It is the main source of energy for the human body, 1g of carbohydrates provides 4 kcal.

In addition to their energetic role, carbohydrates also participate in the formation of cell membranes, connective and support tissue, nervous tissue as well as components with a basic functional role such as hormones, enzymes and antibodies; they participate in ATP and DNA synthesis, and make up generally 2-3% of body weight and have many other functions [6, p.27-28; 15, p.85].

Carbohydrates accumulate in the body as glycogen, which is a glucose polymer. The most important glycogen reserve is in the liver

and muscle. It represents 50-55% from total energy consumption for active people, and up to 70% for people who practice strength training. Glycogen reserves are exhausted relatively quickly, requiring permanent carbohydrate intake during 5-6 meals, necessarily before training, to accumulate energy and post-training to enhance recovery processes [14, p.8; 15, p.85; 17, p.81-83].

Carbohydrates are classified as monosaccharides, disaccharides and polysaccharides [5, p.26-29]. The structural unit of carbohydrates is monosaccharide. Disaccharides are composed of two monosaccharides, polysaccharides from several monosaccharides [14, p.8]. Mono and disaccharides are also called simple carbohydrates and complex carbohydrates-polysaccharides. Simple carbohydrates (sucrose - glucose, fructose, lactose) are assimilated quickly and they are immediately released in the blood.This is superb from an energy-obtaining point of view, but in large quantities and after frequent usage, it can have negative effects on the appetite and glucose levels in the blood, which, in turn, leads to the elevation of insulin levels. More so, when consumedat wrong times, they quickly turn into fat, which is undesirable for athletes. Carbohydrates are contained in pasta, sweet fruits, honey, muesli, white bread, potatoes and others. Complex carbohydrates (polysaccharides - starch) are assimilated more slowly than simple ones, which do not allow rapid elevation of glucose levels in the blood. They are contained in vegetables, fruits, legumes, cereals, cellulose and others [6, p.28-30; 14, p.8-9; 15, p.86-87; 19].

Another aspect that classifies carbohydrates is the Glycemic Index. It shows how quickly sugar enters the blood after a person eats foods containing 50 grams of digestible carbohydrates. Foods with a high glycemic index instantly increase blood sugar levels and with a low GI level - contribute to a slower reaction. Usually, products containing mono and / or disaccharides also have high glycemic index and polysaccharides have low GI [6 p.29-31; 17 p.66-73].

Regarding the daily amount of carbohydrates Cleiner S. [17, p.61,73] recommends 7g / kg bodyweight/day for strength training sports, 8-9g / kg bodyweight/day for athletes combining intense strength and endurance training. Batîrev M, Batîreva T [14, p.89] suggest the idea of carbohydrate consumption depending on the duration of the sports training, namely for every 1-2 hours of strength effort 5-6g / kg bodyweight/day.

According to Graur M. [6, p.28], the brain consumes 120-150g of carbohydrate/day, which determines the recommendation for those who combine intellectual work with intense physical effort of 8-9g / kg bodyweight/day.

Lipids are macronutrients, which are the basic component of the cell. They are part of thecell membrane [15, p.96-97], play an essential role in energy production and represent the most economical energy storage form, as they have the highest caloric density - 9.3 kcal / g [6, p.37]. Lipids are a component part of all biological membranes that are part of the human brain, without their presence there is no synthesis of hormones [14, p.90-91], 60% of the amount of human brain is constituted of fats (mostly Omega 3) [17, p.95-96].

There are three types of fatty acids in the body: triglycerides, cholesterol and phospholipids.

Triglycerides are stashed into adipose tissue and muscles. Of the three types, triglycerids are most involved in the process of energy formation. Cleiner S. [17, p.90] notes

that there are scientific studies involving strength training athletes, in which triglycerides are proven to serve as an important source of energy during intensive training.

Cholesterol is an important component of cell membranes; it forms gender hormones, adrenaline, vitamin D and bile acids. An unbalanced food intake leads to its surplus, which is eliminated by the liver, and the rest is deposited on the walls of the arteries, leading to their narrowing and preventing normal blood circulation. As a result, it can cause serious cardiovascular diseases. The daily requirement is about 300 mg [14, p.11; 20, p.17].

The third type, phospholipids, are involved in regulating blood coagulation. They are part of the structure of all cellular membranes including the brain and the nervous system [17, p.92].

Through food intake, fatty acids enter the body. They are divided into three groups: saturated, monounsaturated and polyunsaturated. A balanced food ration must contain all three lipid groups. According to their origin, the lipids can be of two types: of animal origin in meat, fish, milk, cheese, butter and others, and of vegetable origin found in cereals, nuts, seeds, vegetable oils and others. Animal-based lipids are generally saturated fatty acids and those of plant origin - polyunsaturated. Polyunsaturated lipids include fish oil, soybean oil, peanuts, flax seed, and others. Monounsaturated fatty acids are found in olive oil, peanuts and rapeseed oil [6, p.37-38; 15, p.97-98].

Cleiner S. [17, p. 99] warns that if total lipid intake is reduced or eliminated, there is the risk of developing a deficiency of essential fatty acidsin the body. In such cases, many deficiencies may occur, such as decreases in muscle tissue recovery, in the production of testosterone and deficiencies in lipid-soluble vitamins A, D, E and K, which are antioxidants.

In the opinion of the authors Batîrev M., Batîreva T. [14, p.9] the lipid intake should be 15-20%, while other authors [6, p.38; 5, p.24-26; 17, p.100] propose 30% of total energy intake, where 5% -10% should be saturated fats, 10-15% monounsaturated and 10% polyunsaturated fats.

Conclusions. According to the data, a large number of students do not have the habits of a healthy lifestyle,which is suggested by the presence of anxiety, stress, sleeplessness, hypodynamia, exaggerated intellectual efforts, inadequate nutrition. By following a rational diet, which is part of a healthy lifestyle, the negative effect of the factors mentioned above will be diminished;

It has been determined, that 50% of the success in athletic endeavors depends on well-organized nutrition, which allows the desired results to be achieved. Nutrition is even more important for those athletes who combine intellectual and physical work;

In this paper, several aspects were elucidated: the importance of food macronutrients (carbohydrates, lipids, proteins), their function in the human body their classification, types, value and required quantity for students that practice powerlifting.

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