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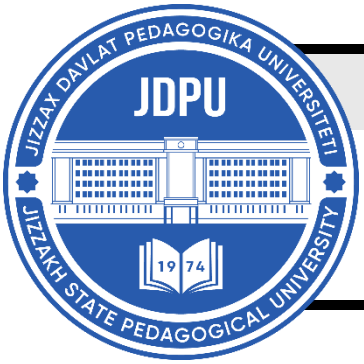

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THE IMPORTANCE OF NUTRITION IN SPORTS

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ABOUT ARTICLE

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Abstract: A number of new studies in this area are gradually refuting the previously generally applied recommendations on the correct composition of the diet. Drinking milk daily so that the body has enough calcium, excessive protein intake damages the kidneys, and consuming the last meal no later than five o'clock - various studies have refuted these and many other recommendations, but some experts still stand by them. Therefore, navigating these often-conflicting opinions is very difficult for the general population and athletes. We evaluated and compared the knowledge of fitness center visitors and top athletes about proper sports nutrition. Here, too, the evaluation of the individual questions of the questionnaire showed us that top athletes are much less knowledgeable about healthy nutrition than visitors to fitness centers. The final goal was to compare the opinion of both of these groups on how diet can affect sports performance and health. However, the hypothesis that elite athletes consider proper nutrition to be a more important factor in sports performance and health than visitors to fitness centers was disproved. In the end, we expected that the main motivation for proper nutrition would be an increase in sports performance and health among elite athletes, while an increase in muscle mass and a reduction in fat among fitness center visitors. In the case of top athletes, the assumption was confirmed, but the fitness center visitors mentioned improving their health in the first place, so the hypothesis was only partially confirmed. Thanks to research, we have

confirmed the fact that recreational athletes, in our case visitors to fitness centers, often eat better and have more knowledge about healthy nutrition. The main problem is the fact that the trainers of top athletes are often poorly educated in the field of nutrition and thus do not provide their clients with any advice on proper sports nutrition or the use of supplements.

INTRODUCTION

Currently, more and more emphasis is placed on proper nutrition, and not only for athletes. This is evidenced, among other things, by the number of publications published every year that deal with this issue. However, the problem remains that the opinions of individual experts are often quite different and people do not know what to believe and are lost in the amount of information that reaches them from various sources (books, magazines, television, from nutritionists, trainers, etc.). In addition, a number of new studies in this area are gradually refuting the previously generally applied recommendations on the correct composition of the diet. Drinking milk every day so that the body has enough calcium, excessive protein intake damages the kidneys, consuming the last meal no later than five o'clock - various studies have refuted these and many other recommendations, but some experts still stand by them. Therefore, it is very difficult for the general population and athletes to navigate these often conflicting opinions. The purpose of the theoretical part of this dissertation is to clarify the basic nutritional recommendations for recreational and elite athletes and to emphasize their specific requirements for proper nutrition in order to maximize performance and promote health.

According to the level of physical load, athletes can be divided into elite, performance and recreational sports. Especially for elite athletes, proper nutrition is an important prerequisite for delivering the best possible performance and coping with extreme physical stress during training and competitions. However, even recreational athletes should pay attention to the correct composition of the menu and the general principles of healthy eating apply to them. (3) Nutrition, sport and health are closely related and influence each other. Physical fitness, performance and state of health are directly dependent on the quality of the diet, so perfect performances cannot be achieved by training alone. The connection between diet and performance was already known in the historical beginnings of sports, when athletes tried to influence their performance by consuming certain foods, especially meat, because they believed that thanks to this they would acquire the characteristics of the animal in question. Wrestlers thus consumed bull meat, while jumpers consumed antelope or goat meat. The basic condition for performing sports performance is the conversion of ingested nutrients into energy. A significant amount of it is needed for heart and muscle activity, especially in athletes. Although it might seem that just getting enough energy is enough to perform well, this is not the case. In addition

to it, a number of other substances are needed, such as vitamins, minerals, as well as an appropriate ratio between sugars, fats and proteins.

"Extraordinary physical exertion that is not supported by quality nutrition can lead to health damage just like physical inactivity and overeating."

Proper nutrition, together with regular physical activity, is an effective means of supporting immunity and reducing the risk of developing various diseases. To be healthy, it is not enough just to do sports and consume unhealthy foods or, on the contrary, to follow a diet and completely skip physical activity. Sport and proper diet go hand in hand. Sports activity is also one of the ways to reduce body fat reserves. Even among top athletes, however, there are those who suffer from overweight or even obesity, even though an optimal body weight is important for maximum health and performance. The reason is such a large energy intake that even considerable physical load cannot compensate. They often mistakenly believe that they can take food in any form and quantity because they have a high energy expenditure, but they no longer take into account the effect of a poorly composed diet on their performance and health.

BASIC FOOD COMPONENTS

We divide all food components into two groups. Macronutrients (major nutrients) include sugars, fats and proteins. The group of micronutrients includes vitamins, minerals and trace elements, which need to be taken only in small amounts compared to macronutrients.

Carbohydrates

Carbohydrates provide the body with the energy it needs to function properly. However, they are not only a source of energy, but in most cases carbohydrate foods also provide the body with other nutrients and fiber. For athletes, their importance is growing, because the correct timing of their intake is necessary to achieve maximum sports performance. They are found in cereals, bread, pasta, rice, potatoes, legumes, fruits, vegetables and many other foods.

Carbohydrate division

Carbohydrates are divided into simple (monosaccharides and disaccharides) and complex (oligosaccharides and polysaccharides) according to the number of sugar molecules. One molecule of sugar is represented by **monosaccharides,** which consist of carbon, hydrogen and oxygen atoms. In all monosaccharides (glucose, fructose and galactose) have the same number of these elements, only their mutual connection is different. In some cases, such as in fruit, they can occur separately, but more common is the combination of two monosaccharides, resulting in **disaccharides** (maltose, sucrose and lactose). Simple sugars are sometimes referred to as "empty calories" because in their pure form they only provide the body with energy. The formation of disaccharides is shown in the table, see Annex no. 1.

Oligosaccharides (maltodextrins or dextrins) contain 3 to 10 sugars units, even though some sources also include disaccharides in this group. Unlike other carbohydrates, they are not broken down in the stomach and small intestine, but are processed only in the large intestine. As a result, foods rich in oligosaccharides can cause gas in some people, and this fact must be taken into account especially before physical exertion. **Polysaccharides,** or complex carbohydrates, are formed by combining a large number of sugar molecules. These include different types of cellulose, especially starch, which is typical of plants, and glycogen found in animals and humans. They generally have a more complex chemical structure and contain more nutrients and fiber than simple carbohydrates. For a better orientation in the division of carbohydrates and their occurrence in foods, the table in Appendix No. 1 is used.

Functions of Carbohydrates

All carbohydrates (simple and complex) are broken down in the body and absorbed into the blood in the form of glucose, which, however, is released at different rates depending on the type of carbohydrate. While monosaccharides are absorbed directly, other carbohydrates must first be broken down into basic sugar units. Part of the absorbed glucose remains in the bloodstream (roughly 5 g) or immediately provides energy to certain organs. The second part is stored in the liver and in the muscles, where it forms storage sugar - glycogen. The stored form of sugar is ready to be converted back into usable glucose if necessary (muscle contraction), implying proper nutrition before physical exertion, when the body will create enough glycogen in the muscles. During exercise, the body first uses glycogen from the muscles, and then, after its exhaustion, it relies on glucose from the blood, which is then renewed with the help of liver glycogen, which is gradually released. Most of the absorbed glucose is taken up by the liver, where, in addition to the already mentioned glycogen, part of it is converted into fat in case of excessive intake of carbohydrates. During exercise, the primary sources of energy are carbohydrates and fats, and their use depends on the intensity of the exercise and its duration. Without access to oxygen, glucose can be used as the only source of energy, as it brings the necessary oxygen with it. Thanks to this, it plays an important role, especially during intensive exercise. Athletes, whether they are bodybuilders or endurance runners, often manipulate their carbohydrate intake and use, among other things, a " supercompensation diet" that specifically increases liver and muscle glycogen stores, resulting in muscle "bulk" and a greater supply of quick energy for upcoming sports performance. Carbohydrates should be around 5 to 7 g per kilogram of body weight per day in the diet and should thus cover more than half of the body's energy needs. However, we often encounter a lower income among athletes, especially among bodybuilders who are trying to reduce their fat reserves.

Glycemia and Glycemic Index (GI)

Two hormones - insulin and glucagon - are primarily responsible for maintaining a constant level of blood sugar (glycemia). Insulin enables the entry of glucose from the blood into the tissues, while glucagon, on the other hand, if necessary, ensures the release of glucose from the storage form of sugar, specifically liver glycogen (it does not work in muscle tissue). The goal of these hormones is to keep blood sugar within a certain range. If the sugar level is low, this condition is called hypoglycemia and we can encounter it especially in elite athletes. If the level is high, it is hyperglycemia.

"The sugar index or glycemic index (GI) indicates how quickly sugar can pass into the blood, i.e. how quickly the blood sugar will increase and subsequently how strong the insulin production will be." Every food has a certain glycemic index. The higher this number, the more it affects blood sugar levels. The glycemic index of foods is also affected by heat treatment, as the starch becomes accessible for digestion and the more glycemia increases. In the same way, the use of table salt accelerates the absorption of glucose, and this fact is deliberately used in sports drinks, where a quick onset of energy is desirable. The maximum GI value is 100 and corresponds to the consumption of pure glucose, some sources indicate white bread. Foods are then divided into three categories: with a high, medium and low glycemic index, and it is generally recommended to consume mainly foods with a lower GI value, which will not cause such large fluctuations in glycemia that could contribute to the development of diabetes mellitus II. type.

Dietary fiber

Fiber is a part of plants that the human body cannot digest and is one of the components that make up the so-called "good carbohydrates", found for example in whole grain products, legumes, fruit or vegetables. Clarc recommends taking at least 25 grams of fiber per day and consuming foods as much as possible in their natural state. During processing, for example in the production of white flour from whole grain flour, this valuable part of carbohydrates is removed. However, this is not desirable, because fiber has a number of positive effects. It keeps the digestive tract healthy, shortens the digestion time of the large intestine, prevents putrefactive processes due to the intake of protein substances and lowers the level of cholesterol in the blood. Another advantage of foods containing fiber is their lower glycemic index, thanks to which carbohydrates are digested more slowly, the gradual release of glucose into the blood and thus a longer feeling of satiety after a meal. In addition, the hardness of foods with insoluble fiber contributes to improving the quality of teeth.

Fiber can have two basic forms. **Insoluble fiber** does not dissolve in water, but binds large amounts of water. It adds volume to the food and thus increases the feeling of satiety. In addition, it is suitable as a prevention of constipation. The source of this type of fiber is mainly whole grain products and vegetables. **Soluble fiber** dissolves in water, forms a gel in it, swells and gives food

density. It is involved in reducing the level of "bad" LDL cholesterol and stabilizing the level of glucose in the blood. It is found, for example, in oatmeal or legumes.

Proteins

"Proteins, or proteins in other words, are the important building blocks of all life." They are made up of carbon, hydrogen, oxygen and nitrogen, some also sulfur and phosphorus. Nitrogen and sulfur are not contained in other nutrients, proteins are their only source.

Amino acids

All proteins are made of smaller structural units - amino acids. There are 20 of these basic ones, and their various combinations and composition in the chain create all kinds of proteins found in the human body. Only three amino acids (leucine, isoleucine, and valine) have side chains, earning them the name "branched-chain amino acids" (BCAAs). Their advantage is faster access to the peripherals (muscles) and quick use as a source of energy or for repairing and building muscle tissue. Amino acids are divided into essential, semi-essential and non-essential.

- **Essential amino acids** are essential and must be taken in sufficient quantities through food, as the body cannot produce them on its own. There are eight of them and they include lysine, leucine, isoleucine, methionine, phenylalanine, threonine, tryptophan and valine. Some sources also include the amino acid histidine among them.

- **Semi-essential amino acids** are indispensable only in certain situations, for example during body growth.

- **Non-essential amino acids,** or expendable, the body also needs, but it can already create them itself.

- Protein function

Proteins are important for the formation of various body structures and a number of physiological functions in the body. It forms the basis of hormones, enzymes or antibodies, and 15-25% of the human body is made up of proteins. Unlike carbohydrates and fats, they do not serve primarily as a source of energy, but mainly as building materials for building muscles. In the case of a well-planned diet, they only cover 10-15% of energy consumption, and only in the case of low energy intake does the unwanted breakdown of proteins and their use to create the missing energy (gluconeogenesis) occur. If necessary, the body can convert carbohydrates into fat and proteins into carbohydrates, but it cannot create proteins from nothing, so they must be taken in sufficient quantities through food.

Proteins received in the diet are broken down into individual amino acids in the body, transported to the tissues via the bloodstream, then folded into the body's own proteins and can be used, among other things, for repairing and building muscle mass. Unlike carbohydrates and fats, they cannot be stored in larger quantities in the body as a reserve, their excess is excreted from the

body in the form of urea. A one-time intake of a large amount of protein is thus ineffective, and it is ideal to consume it in smaller amounts throughout the day.

Protein sources

Proteins can be found in various foods, mostly in eggs, fish, beef, pork, chicken and turkey meat, cheese and yogurt. From plant sources mainly in legumes (especially soy), to a lesser extent in nuts. We refer to foods that contain a sufficient amount of all essential amino acids and in the correct ratio as complete proteins, such as egg and milk protein. Muscle protein does not contain enough of some essential amino acids. (6) Animal proteins usually have more essential amino acids than vegetable proteins, but they have a higher content of fat, especially cholesterol. (7) Skolnik and Chernus (6, p. 46) states: *"Proteins from animal foods are more valuable and more usable than proteins from plant sources. Plant foods also contain amino acids, but the only complete plant protein is soy; others are deficient in one or more amino acids (i.e. incomplete)."*

Protein intake

Probably the most controversial question in connection with proteins is their necessary amount received in the diet. The minimum protein requirement is set at 0.5 g per kilogram of body weight per day, and at the same time half of it must be of animal origin to ensure a sufficient intake of essential amino acids. (13) However, it is generally recommended to consume 0.8 grams of protein per kilogram of body weight, 0.85-0.95 grams for younger, developing individuals, and athletes, depending on the intensity of training, need a little more. (6) Mach states that protein intake should even be in the range of 1-1.5 grams per kilogram. Likewise, Konopka recommends that athletes increase their intake to 1.2 to 1.4 grams per kilogram of body weight.

In athletes, especially strength-oriented ones, we often encounter an abnormally high protein intake due to the effort to grow muscle mass faster. However, excessive protein intake can have a number of negative effects on the body, leading to a higher consumption of certain vitamins and minerals and a greater amount of metabolic products that put a strain on the kidneys and liver. If a person consumes more protein, more fluids must be taken at the same time in order for the kidneys to function properly, which removes the urea produced by their breakdown.

Fats

"Although fat often gets a bad name, it serves vital functions in terms of health and exercise."

For athletes, when fat is consumed and in what amount is important, as both can affect athletic performance, but even in the non-sporting population, fat is an important and indispensable nutrient, it serves as a source and store of energy, it is important for the construction of biological membranes, hormones, bile acids, etc.

Fat composition

Carbohydrates, proteins and fats are made up of various smaller components. In the case of fats, it is three fatty acids linked by glycerol, which gives rise to triacylglycerol (also triglyceride). Fatty acids then consist most often of 16 and 18 carbons connected in intertwined chains. Most of the fats we eat and the fats that are stored in our body exist in the form of triacylglycerides, a smaller part is made up of cholesterol and phospholipids. The properties of individual fats are influenced by the length of the chain, but above all by the number of double bonds.

Separation of fats

Fats are most often divided according to the presence of double bonds into saturated, monounsaturated and polyunsaturated, and a special group consists of trans-fats (trans-fatty acids) and cholesterol.

- **Saturated fats** have no double bonds between carbons in their chain. They usually have a harder form and their source is animal products such as lard, butter, cream, milk, cheeses, yogurts and overgrown meat. They can also be found in plant products, especially palm and coconut oil. Eating a lot of saturated fat is associated with a number of health problems, such as inflammation, increased blood cholesterol, diabetes and some types of cancer.
- **Monounsaturated fats** contain a single double bond in their chain and are intermediate between saturated and polyunsaturated fatty acids, sometimes referred to as omega-9 fatty acids. The source is mainly olive and canola oil, peanuts, most nuts and avocados.
- **Polyunsaturated fats** have more than one double bond and are divided according to their chemical structure into omega-3 and omega-6 fatty acids, which also include the main essential fatty acids – linoleic acid, linolenic acid, EPA and DHA Linoleic acid contains two double bonds in its chain, linolenic acid has three double bonds. Each of these fatty acids must be supplied in a certain amount regularly through the diet. EPA and DHA are only found in marine fish oil and are very useful for human health. Sources of omega-3 saturated fatty acids are fatty fish (salmon, tuna), soybeans, nuts, flax seeds and canola oil. Omega-6 fatty acids contain, for example sunflower, corn, soybean and olive oil.
- **Trans fats** can occur naturally in small amounts in meat and dairy products, or they can be artificially produced. Trans-fats contained in partially hydrogenated (hydrogenated) oils have a negative effect on human health, causing an increase in LDL and a decrease in HDL cholesterol. These fats are created by a process where liquid hydrogen is added to the oil, causing it to solidify. We meet them mainly in cheaper types of margarine.
- **Cholesterol** is a very important substance for the body, which is why the body can create about one gram of it per day and cover its needs. In addition, it is taken from animal products, plant

foods do not contain any cholesterol. In the body, cholesterol is used as a basis for hormones (mainly steroids), for the construction of cell membranes, bile and vitamin D.

Functions of fats

Skolnik and Chernus point out that: " *It is important to distinguish between dietary fat and body fat. Consumed fat performs important functions in the body and is a source of calories. But it doesn't necessarily turn into body fat."*

The body needs a certain amount of fat for several reasons. One of them is the proper function of all cells, especially membranes, in which fat is indispensable. It also protects organs from mechanical damage, reduces heat and water loss, is an important part of nervous tissue, hormones, bile acids and, last but not least, helps the use of fat-soluble hormones. In addition, essential fatty acids, through prostaglandins, serve as prevention of blood clots, reduce the level of cholesterol in the blood and limit the risk of atherosclerosis.

CONCLUSION

Along with carbohydrates, fat is the most important source of energy. A large amount of energy is stored in a small volume of fat. One gram contains 9 kcal (38 kJ), which is more than twice as much as sugars and proteins. Unlike carbohydrates, it can only be used in the presence of sufficient oxygen, which is important for their transformation leading to the formation of ATP. It is burned only during aerobic metabolism or during activity lasting at least three minutes. (3, 6) Like the previous two macronutrients, fats are also broken down into smaller molecules in the digestive tract (triglycerides into individual fatty acids). However, unlike glucose and amino acids, the released fatty acids are not absorbed directly into the blood due to the poor mixing of oil and water, but are found in the blood in the form of molecules called chylomicrons. These then reach the muscles or fat tissue (adipocytes) through the blood and release the individual fatty acids there.

Fat intake

As with determining optimal protein intake, recommendations vary. According to the World Health Organization (WHO), the proportion of fat in the adult population should not exceed 30% of the total energy intake, for physically active people the limit is 35%, and the intake of saturated acids should be no more than 10% of the total energy intake. It is recommended to limit the consumption of trans-unsaturated fatty acids to an absolute minimum, and the cholesterol in the consumed diet should not be more than 300 mg per day. However, Fořt recommends reducing the amount of fat in the diet even more, specifically to 20% of the total energy intake. In athletes who have a higher energy consumption, an energy deficit can occur with such a low fat intake. In such a case, they see the way out in increased consumption of carbohydrates, not fats. Despite all the recommendations, fat makes up an average of 35% of the total energy intake in most developed countries, and even 38% in the Czech Republic. It is not only the amount of fat taken in that is important, but especially the proportion

of individual types. The correct ratio should be 1 part saturated, 1 part monounsaturated and 1 part polyunsaturated fatty acids, although saturated fats are not needed at all.

REFERENCES

1. FORT, Petr. 2002. Sport and proper nutrition. 1st Ed. Prague: Ikar. ISBN 80-249-0124-2.

2. SKOLNIK, Heidi and Andrea CHERNUS. Nutrition for maximum sports performance: properly timed diet. 1st Ed. Prague: Grada, 2011. ISBN 978-80-247-3847-5.

3. CLARK, Nancy. Nancy Clark's sports nutrition guidebook. Champaign, IL: Human Kinetics, 2008. ISBN 978-0-7360-7415-5