

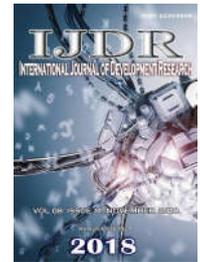


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PREVENTION OF OVERWEIGHT AND OBESITY THROUGH NUTRITION IN CHILDHOOD AND ADOLESCENCE

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ABSTRACT

Nutrition is essential in order to maintain and restore the functions of the human body. Due to the changing living conditions of children and adolescents, the problem of overweight and obesity has greatly increased in industrialized countries and therefore it is urgent to take action. The purpose of this study was to approach, analyse and ultimately examine the rules for a healthy and balanced diet and to make it understood that they should be an integral component of today's life of children and adolescents. The method adopted for the study was a review of the relevant literature. Based on this study, it is found that the "optimized mixed diet" corresponds to today's knowledge about the proper nutrition for children and adolescents. This diet is called "optimized" because it covers the need for all nutrients and at the same time prevents the so-called diseases of modern civilization (hypertension, cardiovascular diseases, osteoporosis, gout). The "Optimized Mixed Diet" maintains a ratio of 15:30:55 (albumen, fat, carbohydrate) and sugar addition of only 5%. Therefore, this diet is low in fat and sugar, and is recommended for both prevention and treatment of obesity. Due to the fact that slimming methods have limited success, primary prevention is of great importance, e.g. early guidance to a well-balanced diet, reasonable behaviour in terms of movement and recreation, as well as a positive body image. It is important for parents to attend to their children's diet and observe their dietary patterns. Thus, the immediate intervention of guardians is required when the weight of children increases disproportionately quickly. Some unhealthy and fattening eating habits can be fought from scratch before they develop, in the worst-case scenario, into an eating disorder. Prevention should begin as early as possible. This is especially true for children and young people who have an increased risk of obesity due to family predisposition. It is important that children and young people are permanently involved in the subject of nutrition and that this engagement accompanies them in their development.

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INTRODUCTION

In view of the fact that nutrition is vital for human health, the essential ingredients of nutrition are the central theme of this study. These are the prerequisite for understanding how nutrition affects various diseases. Obesity is considered a chronic condition, resulting in limited quality of life and high risk of morbidity and mortality. Especially in childhood and adolescence this disorder has negative effects on almost all organ systems. Thus, excess overweight is considered an important risk factor for the occurrence of sugar diseases and high blood pressure.

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There are also signs of inflammation of the overweight children's vessels, which may result in blockage of the vessels and therefore in congestive heart failure or myocardial infarction. Nutrition is essential in order to maintain and restore the functions of the human body. Nutrients are substances contained in food that have a nutritional effect on the body. They are subdivided into essential (necessary for life), nonessential (can be replenished) and nutrients (which help the body function). The body cannot synthesize the essential nutrients on its own and their action cannot be replenished by other nutrients. In their absence typical symptoms of deficiency can occur, which can only be eliminated by taking the relevant substance (vitamins). Nonessential substances can be synthesized by the body when the necessary nutrients are present. Their lack does not cause

deficiency symptoms (carbohydrates). The substances that help body function are not nutritional on their own, but they assist certain functions of the organism (substances that are not completely absorbed). In the prevention of obesity, nutrition plays a crucial role, since the development of obesity is a positive energy balance. This means that the body through food intake receives more energy than it can consume by its basic functions and physical activity. Children are born in a nutritional culture. By habit, observation, and experience they learn to eat and desire food and drink. Diets are considered, among others things, as a tertiary prevention in the context of nutrition. By reducing calories, a negative energy balance can be achieved more quickly than by increasing energy consumption through physical activity (GOLDFIELD & EPSTEIN, 2002).

MATERIALS AND METHODS

The present research is a bibliographic review study, presenting the critical points of the existing knowledge about Prevention of Overweight and Obesity through Nutrition in Childhood and Adolescence. There is no specialized and comprehensive work on this subject in the relevant international literature. This work endeavours to cover this gap, and will perhaps also be a useful aid for those who in the future will attempt similar efforts. The main aim of the bibliographic review is to frame the study within the "body" of the relevant literature. The review of the current study concerns clearly formulated questions and uses systematic and explicit criteria for critically analyzing a body of published papers by summarizing, sorting, grouping and comparing.

Bibliographic review study

Basic Nutrients: Nutrients are separated according to their action or function in:

-substances that provide energy	(carbohydrates, lipids, proteins, alcohol)
- active substances	(substances not fully absorbed)
- protective substances	(vitamin E)
- regulatory substances	(natural oestrogen's)
- structural substances	(of body structure and enzymes)

The major nutrients are carbohydrates, fats, proteins, vitamins, minerals and water. Carbohydrates, fats and proteins can substitute each other in terms of their energy content (equivalent substitution). The energy content of the diet refers to kcal KJ (1 KJ = 0,239 kcal, 1 kcal = 4,184 KJ).

The energy needs arise from

- **The basic metabolism:** the minimum amount of energy necessary to preserve life, maintaining minimal organ function (circulation, respiration, renal function) and body temperature.
- **The need for maintenance:** the amount of energy to be given to the body as a counterpart to the energy consumed for basic metabolism. It is greater than basic metabolism, and is determined by heat loss in the intermediate metabolism (about 12%) and the need for minimal physical activity (about 15%).
- **The need for performance:** the energy needs for physical activity as well as for growth, pregnancy or renewal of body substances. However, for maintaining vital functions, the composition of the nutrition is important (DGE, 2000 & HOLTMEIER, 2002).

Carbohydrates

The energy content of carbohydrates is 4.1 kcal/g. Carbohydrates consist of carbon, hydrogen and oxygen (chemical formula $C_nH_{2n}O_n$) and are divided into mono-, di-, oligo- and polysaccharides.

Monosaccharides: Simple sugars are the smallest functional building blocks of carbohydrates. Only monosaccharides are absorbed in the gastrointestinal tract and are no longer disintegrated during digestion by acid hydrolysis. They are a form of transport of carbohydrates and serve as rapidly available energy carriers. For human nutrition, the essential ones are glucose, fructose and galactose.

Disaccharides: The most important saccharides consisting of two monosaccharides are:

- lactose: galactose + glucose
- maltose: glucose + glucose
- sucrose: glucose + fructose

Oligosaccharides: They consist of 3-10 monosaccharides and are also useful for energy intake.

Polysaccharides (complex carbohydrates): Polysaccharides serve as support substances and stock. Unlike the mono- and disaccharides they do not have a sweet taste and do not dissolve in the water. The most important polysaccharides are amyllum, glycogen and the substances cellulose and pectin which are not completely absorbed.

The most important properties of carbohydrates are:

- ✓ the intake of energy in an aerobic and anaerobic way,
- ✓ saving proteins by salt formation,
- ✓ that glucose is preferred by the central nervous system as a substrate,
- ✓ that it is a building block in the citric circle and the phosphate pentose cycle,
- ✓ that neutralizes compound toxic substances, foreign to metabolism (drugs and dysentery products), by conjugation with glucuronic acid and
- ✓ that it is a sweetener in the diet.

Basically, a carbohydrate-rich diet (at least 2/3 complex carbohydrates), namely 55-60%, is recommended because they are rich in non-fully absorbed substances, potassium and vitamin C. They are also poor in cholesterol and saturated fatty acids HOLTMEIER, 2002 & MRI, 2008).

Lipids (fats): Fat, with an energy density of 9.3 kcal/g, is the largest energy provider. Fats are also important for the physiology of food as a solvent for vitamins A, D, E and K. Edible fatty acids are distinguished based on their double bonds in:

- **Saturated fatty acids** (without double bonds), predominantly of animal origin e.g. pork fat, butter, beef fat, milk, meat, and coconut oil.
- **Monounsaturated fatty acids** (a double bond) e.g. in olive oil, peanut oil and rapeseed oil.
- **Unsaturated fatty acids** (two double bonds) of plant origin, e.g. linoleic acid, mainly sunflower oil, soybean oil and corn oil.

- **Polyunsaturated fatty acids** (many double bonds) of the type of n-3- or n-6-fatty acids, especially the linoleic acid family, occurring in fish oil and linseed oil (OLTERSDORF, 2003).

Essential are the supersaturated fatty acids "linoleic acid", "linolenic acid" and "arachidonic acid". However, it is sufficient to receive only linoleic acid through the food. Arachidonic acid can be synthesized from linoleic acid, where linolenic acid is produced as an intermediate product. Therefore, arachidonic acid and linolenic acid are partially essential. The need for essential fatty acids is about 2% of the energy intake (about 10 grams of linoleic acid per day). The ratio of polyunsaturated to saturated fatty acids is characterized as P/S ratio (polyunsaturated/saturated fatty acids). Triglycerides result from three fatty acids, which have been glycerine-solidified, and form the main food fat and the fat storage in adipose tissue. Beyond cholesterol and, to a lesser extent, phospholipids, they are the main energy providers. Enzymatic cleavage of triglycerides in free fatty acids (FFS) and diglycerides is performed by the saliva, stomach and pancreas lipases. Cholesterol esterase are hydrolysed by pancreatic cholesterol, phospholipid cleavage is done by phospholipases. A precondition for absorption from the intestine is the formation of micelles, which result from the effect of bile. Then, in the mucosal cells of the colon, on the one hand chylomicrons are formed with 99% lipids (90% triglycerides from edible fats with long chains, 5% cholesterol, 4% phospholipids) and 1% apoprotein, which result in blood circulation through the chest tube. On the other hand, fatty acids of small and medium nutrition chains can be transported directly to the liver via the portal vein.

The most important functions of the liver are

- energy provider,
- thermal protection (saving fats as insulating material),
- building blocks for various biosynthesis,
- carrier of other nutrients (e.g. essential fat-soluble vitamins).

The recommended daily intake of fat is 25-30%, of which one third is saturated, one third monounsaturated and one third polyunsaturated fatty acids (OLTERSDORF, 2003).

Protein (albumen)

The energy content of albumen is about **4.1 kcal/g**. Proteins are formed from amino acids. With regard to amino acid composition, they are divided into:

- Essential amino acids** (leucine, valine, isoleucine, threonine, methionine, phenylalanine, tryptophan, lysine)
- Semi essential amino acids**(arginine, histidine)
- Nonessential amino acids** (glycine, alanine, serine, cystine, tyrosine, proline, hydroxyproline, aspartic acid, glutamic acid).

Proteins that are obtained by nutrition are of greater value, the less they need to achieve a good nitrogen balance. Thus, results the recommended protein intake of 0.8 grams per kilogram of body weight per day (about 15-20%), which exceeds the minimum amount of protein of 0.6 grams per kilogram of body weight needed for balance and physiology.

Here we take into account the individual differences and the different biological value of the proteins obtained with the diet. The body has a certain need for amino acids, not for proteins. The more the amino acid standard of a received protein corresponds to the need for amino acids, the higher its biological value (% of body protein, which can be formed from 100 grams of the relevant protein contained in the food). The percentage of essential amino acids is critical, among other things, for its biological value. Complementary action is important with the combination of foods. Thus, higher biological values can be achieved in comparison with what would be possible with individual foods (egg with potatoes, legumes with milk, wheat or rye). Animal proteins in general, because of their higher affinity to human proteins, have a higher biological value than plant proteins, so at least one third of the protein need should be covered with animal protein.

The most important functions of proteins are:

- a) as prophylactic substances which stabilize the pH,
- b) as building blocks of the cells,
- c) for specific and non-specific defences,
- d) as an ingredient of enzymes and hormones,
- e) as a transport function (lipoproteins),
- f) for the renewal of body substances containing the albumen,
- g) replacement of effluents,
- h) for hair and nail replacement; and
- i) to replace exfoliated cells of the skin and the digestive tract (OLTERSDORF, 2003).

Substances not fully absorbed

Substances that are not completely absorbed are those that are obtained with food, but cannot be used in the digestive tract. They are mainly derived from support elements and cell walls of plants. Essentially these are high polymeric carbohydrates (cellulose, pectin substances, gum, arginine, chitin, wax) and lignin, a polymer of phenylpropane. Due to the fact that the food that is fully digested will leave a mostly not filled final intestine, the substances that are not completely absorbed ensure the filling of the intestine, therefore maintain the peristaltic function and thus contribute to the avoidance of constipation. The intake of substances that are not completely absorbed must exceed 30 grams per day (potatoes, bananas, apples, onions, peas, corn) (KASPER, 1991).

Alcohol: With regard to energy content, alcohol plays a not so insignificant role. With about 7 kcal, alcohol contains more energy than carbohydrates and album. But alcohol is not a nutritional substance, but a means of enjoyment and therefore is not essential (KASPER, 1991).

Vitamins: The human body is unable to synthesize vitamins on its own. These should be taken with food either as vitamins or in the form of a previous stage. Vitamins are essential organic substances on which the body relies for executing various tasks. The human organism is unable to synthesize vitamins on its own. To meet the need for vitamins, a very small amount is needed, which is why they cannot play a role in the supply of energy. Because vitamins are determined by their action and not by their chemical structure, they belong to completely different substance categories. They are roughly classified as water-soluble and fat-soluble vitamins. There is no food that contains in sufficient quantity all the vitamins that

are necessary for an adult human. For this reason, the optimal vitamin intake is achieved only with a mixed and varied diet. Vitamins are relatively unstable compounds in food and can be destroyed to varying degrees by the influence of light, heating and oxygen. Vitamin deficiency can be caused by unilateral nutrition, vitamin degradation due to inappropriate food preparation or very low nutrient content (that is, a quantity of vitamins per unit of energy) in slimming diets. Also, intestinal lesions (chronic diarrhoea) or conditions of increased need (fever, anxiety, alcohol and smoking) can lead to a state of vitamin deficiency. There is no exact definition of the need for vitamins. Everyone agrees widely that the lack of deficiency symptoms is not sufficient to meet the needs, but the objective of optimal health is inexact because there are no unequivocal criteria for this issue. For this reason, the recommended values are defined by the need and by standard deviations from the mean value of one population group, so that 97.5% of the people meet their need with that value. Most of the time, however, these values are the minimum values that are sufficient to avoid characteristic exhaustion symptoms. A higher security value is also given (BAESSLER *et al.*, 1992, GEISS & HAMM, 2008).

Mineral elements: Mineral elements are inorganic active substances that are vital to the life process. They are structural and regulatory substances for the human organism and appear in the tissues and body fluids, mainly in the form of ions, and they are called electrolytes. They participate in creating stimulations, in responding to stimulations and in muscle contraction. Mineral elements must be taken with food. Because they are needed in different amounts in the body, they are divided into quantitatively measured elements and trace elements, where the limit is between magnesium and iron, namely at a concentration of 50 mg/kg body weight (= 0.005 weight ratio). Quantitatively measured elements are all essential because the body has little storage capacity. The trace elements are subdivided into essential, with known physiological functions and with a function that is still unknown, and trace elements with toxic action (MENDEN, 1990).

There are metal elements in the animate and inanimate nature. However, their existence in humans does not indicate necessity or function. The need exists only when there are deficiency symptoms in the absence of an element. As a rule, there are no symptoms of deficiency of sulphur, sodium and chlorine, but rather of their excessive intake. For this reason, in the column of foods that are particularly rich in these elements, the recommendations for foods containing them are in brackets. Trace elements are not found in food as free elements, but rather as complexly bound ions. Therefore the uncontrolled enrichment of food with trace elements in the form of free metal ions creates abnormal conditions, which can be dangerous for several reasons due to:

- a) Of the short time, most of the time, between the desired reception and the toxic action,
- b) The potential for strengthening, competition and different interactions between trace elements, the consequences of which should not be underestimated,
- c) Inter alia, significant bactericidal activity and as a result of the effect on the intestinal microbial flora, and
- d) Sensory reasons.

Under certain conditions, toxic trace element concentrations may appear artificially in food. The most important ways are:

- a) residues of pesticides, herbicides,
- b) transport from apparatuses used for the production or processing of food,
- c) the addition of chemical substances or technical auxiliaries during food processing
- d) penetration into the food from the packaging material.

Some more recent essential trace elements are silicon, vanadium, nickel, tin and arsenic, the vital function of which was demonstrated by animal experimentation. The biological functions for humans are still relatively unknown. Calculated Recommended Daily Intake (MENDEN, 1990):

Silicon 50-250 mg,

Vanadium 1-2 mg,

Nickel 0,3-0,8 mg

Tin 3-4 mg κατ

Arsenic 1-2 mg

Water balance: The balance of water and electrolytes is a functional module, because body water is a solution with a constant electrolyte content, and changes in electrolyte concentration always lead to changes in water concentration and vice versa. Water is the substance contained in large quantities in every living organism. To determine the human body's content in water, we get in most cases high fluctuations values, due to the different fat content. We generally find water content of 48-70%, where the average value for women is 50% and for men 60%. Older people have lower water content and infants have higher water content (about 75%). If we calculate the water content of body substances that do not contain fat, then for all people, and moreover for both overweight and underweight, we find values around 70-73%. Due to its particular properties water has a number of functions in the body:

- As a solvent, through which substrates and products are transferred to the body, e.g. the transfer of substances into the blood. Genuine solutions, colloidal solutions or emulsions may occur.
- As thermo-regulating agent due to high exhaust heat. With this, even when small amounts of water are exhausted, large amounts of heat can be produced for the body. The vapor escapes from the skin or the lungs.
- Maintaining homeostasis. Urea accumulates constantly during metabolism and must be virtually quantitatively separated. The regulation takes place in a totally specific concentration.
- As a means for metabolism reactions.
- As a reagent in numerous reactions of the intermediate metabolism, e.g. as a co-substrate in the action of hydrolases and hydrates in the digestive process
- As a component of the structure of macromolecules (nucleic acids, proteins, polysaccharides), which form hydrogen bridges between water and the macromolecule. Such macromolecules are found e.g. in the membranes.
- Maintain body volume through osmotic pressure. The osmotic pressure of body fluids is 0.33-0.35 osmol/l.

The body has few water reserves, so the lack of water quickly leads to a negative influence on the functions. These include

dysfunction of the circulatory system due to electrolyte transfer and retention of urine substances. Normally, water intake is not a problem. Only in the case of infants who have unstable water metabolism and cannot satisfy their thirst for themselves and of older people that have lost the feeling of thirst may difficulties arise on this issue (MENDEN, 1990).

Diets

Mixed low calorie diet: In fact, a low energy calorie diet seems to be the most appropriate one. It is based on three food intake principles:

- Reduce calorie intake by limiting fat intake, sugar consumption and alcohol.
- Preference for foods rich in ingredients that are not fully digestible.
- Sufficient fluid intake with non-calorie or very low calorie drinks.

In the long term, this is the best slimming method because it ensures adequate intake of essential nutrients with significantly reduced energy intake. A disadvantage of this form of diet is the relatively small weight reduction on average by 1 kg per week.

However, it has many advantages: With this diet there is no shortage of vital elements of the body. It does not have the effect of changing metabolism. It does not lead to albumen loss and therefore to muscle loss. This ensures that the ability to work is maintained. Furthermore, slimming becomes also a learning experience, since the person on the diet learns the energy content of various foods and learns to appreciate it according to his/her needs. The mixed low calorie diet can be carried out without time limitation (KASPER, 1991, WALLNER *et al.*, 2003).

Diet with industrial products: These products contain all the nutrients needed by the body and additionally they include the necessary vitamins and essential minerals. For this reason, there is no problem to use them for a longer period, even if they are used exclusively. These products can also be used in combination with the mixed low calorie diet. The advantage of this type of diet is that it is simple and comfortable to execute. There is also no need for calorie counting, because the packages contain precise data. Disadvantages are the absence of learning, in the case of a longer-term diet, the high cost and the flavour that becomes vapid with time (KASPER, 1991, WALLNER *et al.*, 2003).

Zero diet: Only zero-calorie beverages (at least three liters) are allowed in the zero diet. In most cases, a pill with vitamins and minerals is also administered. Zero diet should be performed only under medical supervision, since it hides risks due to the metabolic change that occurs. It is only rarely applied, even to extreme overweight cases and then most of the times under hospitalization.

Zero diet has two major drawbacks: On the one hand, besides the desirable fat degradation, it also induces the undesirable loss of body proteins (degradation of muscle mass). On the other hand, this slimming method is not a learning experience. Thus, as a rule, older dietary habits, which led to overweight, are generally maintained, while it is

almost certain that another diet will have to be scheduled (KASPER, 1991, WALLNER *et al.*, 2003).

Unilateral diets: Treatment regimens that most often prefer a nutrient (carbohydrate in potato diet or pasta diet) or avoid as much as possible a nutrient (Atkins diet low in carbohydrates) are not recommended. The reason is that they do not provide all the important substances that are vital to the body. Also in some of these diets, such as the Atkins diet, there are changes in metabolism that present health risks (gouty arthritis). Slimming in most cases is achieved by reducing appetite for the relatively monotonous food. The long-term outcome is also doubtful, because here too there is no training for better nutritional behaviour (KASPER, 1991, THEOBALD, 2002).

Ideal diet: It is important for the ideal diet to change the individual's eating habits in the long run. Reduced caloric intake should be continued. A well-structured program may possibly provide information on diet and food, but children and young people do not learn in this way to eat better and develop their own regulatory mechanisms (GOLDFIELD & EPSTEIN, 2002). As the success of dieting measures is limited, primary prevention is of great importance, e.g. early guidance in a balanced diet, reasonable behaviour in terms of movement and recreation, as well as a positive image of the body. Schools and other socialization institutions have important functions by discussing nutrition during the courses and promoting exemplary learning and motivation through joint meals. According to research on nutritional preferences, it is known that children and young people would eat anything that they find most delicious. This includes mainly sweets and high fat foods. Due to the constant availability of these foods and the increasing lack of activity, the possibility of overweight is increasing. Here the learning factor described previously in the socialization of children does not play a unique role. On the contrary, acquiring eating habits takes place immediately after birth. Many children present tendency to overweight already from their cradle. Karl Zwiauer and Doris Oberle evaluated surveys that concern breastfeeding and overweight. Eight out of eleven studies have shown that breastfeeding has a protective effect. Children who have been breastfed were 20 to 35% less possible to become overweight than those who have not been breastfed (MRI, 2008). Therefore, breastfeeding can be considered a primary prevention against obesity. The first major study on the relationship between breastfeeding and overweight is based on a 1997 survey with children starting school for the first time in Bavaria. Data from 9,357 children aged between five and six years were analysed. The children with a body mass index of over 97^o percentile were considered as obese. According to the survey, 4.5% of the children who had never been breastfed were obese. Among the children who had been breastfed the percentages were lower, only 2.8% (MRI, 2008).

If we distribute this value, we end up with the following result:

- *Breastfeeding duration up to two months: 3.8% of obese children.*
- *Breastfeeding duration of up to five months: 2.3% of obese children.*
- *Breastfeeding duration up to 12 months: 1.7% obese children.*
- *Breastfeeding duration over 12 months: 0.8% of obese children.*

Table 1. Optimi X – Developmental criteria of the *Optimized mixed diet* (FKE, 2007)

Recommendations for food intake: Proteins, fats, fatty acids, carbohydrates, non-fully digestible substances, vitamins, minerals, water		Prevention of later diseases due to nutrition: Cardiovascular diseases, obesity, diabetes mellitus, osteoporosis, gout, caries, bowel diseases, various types of cancer.
	Optima X: The optimized mixed diet	
Food choice: - ordinary, cheap food - few prepared food products, - no dietary products	Nutritional preferences: sweets, French fries, fast food	Meal habits: - 3 main meals with bread (2 meals, 1 hot meal) - 2 small meals (mid-morning and mid-afternoon snack)

The protective effect of breastfeeding is not attributable to differences in the socio-economic situation or differences in lifestyle. Still there is no explanation as to what is the possible protective effect of breastfeeding. It is likely that children who have been breastfed can regulate energy intake. Breast milk, among other things, also contains growth factors, that is, an agent that can prevent the deposition of adipose tissue, as well as the leptin saturation enzyme. In a comparison between children who breastfeed and children who don't, the concentration of leptin in the serum of breastfed infants is significantly greater than in those receiving artificial food. Furthermore, artificial milk has a higher content of energy and nutrients than breast milk. Therefore, this leads to significantly higher insulin values after eating. This in turn favours fat deposition, which could enhance premature adipocyte growth (MRI, 2008). Even though the importance of breastfeeding compared to parental weight, family eating habits and lack of physical activity is estimated to be relatively small, promoting breastfeeding can make a positive contribution to the prevention of obesity.

Healthy and balanced diet: The goal is to find rules for a healthy and balanced diet and to understand that they should be an integral part of our present life. Then the diet is considered reasonable, according to the recommendations of the German Nutrition Company (DGE). DGE (2000) drew up ten rules based on current scientific knowledge on full value food and drink, which promotes health, performance and wellbeing:

- Food variety.
- Cereal products, many times a day, and abundant potatoes.
- Five servings of vegetables and fruits a day.
- Daily milk and dairy products, once a week fish, meat, charcuterie products and eggs in moderation.
- Little fat and few foods rich in fat.
- Sugar and salt in moderation.
- Abundant liquids.
- Delicious and healthy cooking.
- Enjoy food without hurry.
- Weight monitoring and movement.

Dortmund's Children's Diet Research Institute (FKE, 2007) has developed a plan for the "Optimized Mixed Diet" called "optimiX". It has included the nutritional preferences of children and young people, and can provide a guide to a balanced diet. The "optimized mixed diet" corresponds to today's knowledge about the proper nutrition for children and young people. This diet is called "optimized" because it covers the need for all nutrients and at the same time prevents the so-called diseases of civilisation (hypertension, cardio-circulatory diseases, osteoporosis, gout) (KASPER, 1993 and HOLTMEIER, 2002).

Present-day diet for children and adolescents is made up of albumin building blocks, fat and carbohydrates (sugar additions) at a 13:38:49 ratio. On the other hand, in the "optimized mixed diet", the ratio is 15:30:55. In present-day diet the addition of sugar is 14%, in the "optimized mixed diet" only 5%. Therefore, this diet is reduced in fat and low in sugar and is recommended for both prevention and treatment of obesity (FKE, 2007).

In optimiX there are three simple rules for choosing food:

- Plenty of plant origin foods and drinks.
- Animal food in moderation.
- Few foods rich in fat and sweets.

These rules can be presented in the form of a dietary pyramid. Their food groups are classified according to the daily recommended amount. The colours of the individual components correspond to the lamp system.

- **RED:** for pleasure and refinement.
- **YELLOW:** to be consumed in moderation.
- **GREEN:** to satisfy hunger and thirst.

The base consists of beverages and cereals, cereal products and legumes, while on the top are the sweets. It is important for parents to attend to their children's diet and observe their dietary patterns. Thus the immediate intervention of guardians is required when the weight of children increases disproportionately quickly. Some unhealthy and fattening eating habits can be fought from scratch before they develop, in the worst-case scenario, into an eating disorder. Prevention should begin as early as possible (FKE, 2007).

Conclusions

Nowadays, also children face health problems to a greater extent, which is related to lack of movement, media outbreak, unhealthy nutrition and altered family circumstances. Due to the changing living conditions the problem of overweight and obesity has greatly increased in industrialized countries and therefore it is urgent to take action. Overweight people have a higher health risk in the form of cardiovascular diseases, diabetes mellitus and premature bone and joint system damage. It is important that children and young people are permanently involved in the subject of nutrition and that this engagement accompanies them in their development. It seems that prevention and treatment in this target group could be more successful than in adults, since children and young people are more receptive to interventions. Their eating habits are not as well established as those of adults. Even though children and young people have already developed a body image defined by society, it is not yet as apparent as in adults.

For this reason, they may be able to respond more easily to preventive measures that aim to change their behaviour in terms of nutrition. Timely change in eating habits and possibly providing medical and psychological advice prevents the slightly overweight children from becoming obese. Particularly parents should be careful to provide for their children a well-balanced diet. Prevention should begin as early as possible. This is especially true for children and young people who have an increased risk of obesity due to family predisposition.

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