



Nutrition of elderly people diagnosed with type 2 diabetes

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SUMMARY

Diabetes is a disorder resulting from both genetic predispositions and unfavorable environmental factors. It is characterized by altered metabolism of carbohydrates, fats and proteins, whose cause is absolute or relative deficiency of insulin secretion and varying degrees of insulin resistance. Literature suggests that diet in diabetes is not much different from the rules of proper nutrition for healthy people. It is of paramount importance in maintaining a healthy body weight, normal blood glucose levels and optimal serum lipids.

The growing elderly population and the incidence of diabetes increasing in this group forced to take into account their specific needs. Since adequate nutrition is essential for the proper conduct and self-treatment of diabetes, the recommendation should be adapted to the nutritional habits of the elderly. Rating nutrition of people with type 2 diabetes should be comprehensive and take into account the unique nutritional needs of each patient.

The aim of the study was to assess dietary habits among elderly people suffering from type 2 diabetes and to compare the diets of older people with type 2 diabetes with nutritional recommendations of the Polish Diabetes Association.

Key words

diabetes, diet, therapy

TYPE 2 DIABETES

The etiology of type 2 diabetes is not fully explained. The major reason is the reduced sensitivity to insulin (insulin resistance) and impairment of β -cell function, which in turn leads to extensive metabolic and clinical onset of the disease [1,2,3,4]. Initially, the clinical symptoms are less marked, and therefore a diagnosis of the disease occurs when there already are complications. Insulin resistance, which affects the occurrence of diabetes, decreases the effectiveness of the biological activity of insulin on glucose metabolism. The end result of insulin resistance is reduction of the ability of the hormone to inhibit hepatic glucose production and increase of glucose uptake by muscle and fat. To compensate for the phenomenon of insulin resistance, the secretion increases to maintain a normal glucose level. In individuals predisposed to type 2 diabetes the β -cells are unable to compensate for long-term hyperglycemia and reach the concentration of glucose in the blood after meals. Disorders of insulin secretion are progressive and can lead to a fasting hyperglycemia [5,6].

The main predisposing factors for type 2 diabetes:

Insulin resistance is increased by the presence of genetic factors in families, high compatibility of occurrence in monozygotic twins and high prevalence in certain ethnic groups (e.g. Piam Indians) [7,8] and environmental factors associated with lifestyle and diet (high caloric diet, obesity, avoidance of physical exertion), differences in the incidence of similar populations living in different geographical areas (e.g. Asians in the US), aging and reduction of the delay in insulin secretion, delayed absorption of food [7].

The characteristics of the type 2 diabetes is the age over 30, often insidious onset with a few selected symptoms of rarely occurring ketoacidosis, no association with histocompatibility (HLA) genes, the incidence of diabetes in the family, compatibility of monozygotic twins, the ability to control the disease with diet and oral antidiabetic drugs – insulin treatment may also be necessary in coexistence of insulin resistance and relative deficit of glucose, and very often accompanying obesity [9].

The basic symptoms of diabetes include:

- a. thirst,
- b. polyuria, urinary frequency,
- c. the fatigue and malaise,
- d. skin and genitourinary infections (e.g. fungal),
- e. visual disturbance - transient myopia disorders,
- f. weight loss,
- g. complications: hypoglycemia, coma; chronic retinopathy, nephropathy, neuropathy, diabetic foot; changes in large vessels, cardiovascular disease, cerebrovascular disease, peripheral vascular disease,
- h. mental disorders [7,10]

Treatment of type 2 diabetes consists of applying a proper diet, anti-diabetic drugs and/or insulin and moderate physical activity – a healthy lifestyle.

THE ELDERLY DIABETES PATIENTS

The simplest definition of the elderly is based on the criterion of age. It is 65 years of age as the time in which a person enters into the old age. In practice, also other data such as information on the activity in life, intellectual and physical fitness, mental status, and comorbidities should be taken into account. Old age brings a lot of health problems such as cardiac and skeletal muscles, blurred vision, memory disorders or cardiovascular diseases [11].

Developing a diagnostic and therapeutic plan needs to take into account patient's current somatic state, assessment of the social, functional and approximate determination of survival. Among the risk factors for diabetes, the age extends in the foreground. Other factors that influence the glucose metabolism disorders in the elderly include changes in diet, decreased physical activity, decreased muscle mass, decreased insulin secretion and insulin resistance [11,12,13]. The development of glucose intolerance is a recognized metabolic change that occurs in the aging process, and a degree of glucose intolerance later in life is a common phenomenon occurring in healthy people. Within each decade of life after reaching 30, the auxiliary blood glucose increased on average of 5.3 mg/dl and fasting 1-2 mg/dl. A typical regimen of diabetes, including dietary restrictions, increased physical activity and pharmacologic interven-

tions, can lead to additional health risks in the elderly. Unwanted weight loss, decreases in the levels of glucose and downs contribute to adverse health effects. Nutritional intervention in older people is extremely important because it can prevent such risks [14]. Elderly patients tend to change dietary habits and reduce carbohydrates, which in the long term can predispose to glucose intolerance [15]. A diet that contains the right amount of carbohydrates improves the sensitivity of peripheral tissues to insulin in the elderly. An important factor in reducing insulin resistance and improving glucose tolerance is increasing physical effort, which often decreases with age [16,17].

2. TREATMENT OF DIABETES

In treatment of people diagnosed with diabetes it is necessary to recognize which type of diabetes we have to face. Depending on the type of diabetes, drug treatment, diet and controlled physical activity are used.

2.1. DIETARY TREATMENT

Dietary treatment is an integral part of the treatment of diabetes, which results in metabolic control. It takes into account the individual objectives of the treatment, the patient's energy requirement, which depends on the age and type of work [18].

Proper nutrition is of particular importance in diabetes, proper selection of foods can regulate sugar levels in the blood. In any case, it does not mean starvation or surrender of many favorite dishes. The diet should be varied, preferably based on organic food and similar to the physiological diet, but it should limit or completely eliminate sugar. There are important principles, compliance with which allows you to keep fit and maintain proper blood sugar levels [19]:

1. The standardization of body weight in diabetes is often accompanied by overweight and obesity. Overweight and obese people should be encouraged to limit calories. All overweight (BMI 25 to 29.9 kg/m²) or obese adults (BMI \geq 30.0 kg/m²) are recommended to introduce lifestyle changes, which include reducing calorie intake and/or increased physical activity; a moderate reduction in caloric balance (500-1000 KCl/d), most patients on a weight loss diet should provide their bodies with at least 1000-1200 kcal/d in the case of women and 1200- 1600 kcal/d for men [20,21].

2. Several small meals throughout the day – right planned nutrition is best divided into 5- 6 small meals throughout the day. Monitoring the total carbohydrate content of the diet (use of carbohydrate replacement – 1 chocolate bar is about 10-12g carbohydrates), calculating the glycemic index of the products to prevent sudden surges in blood glucose and maintaining it at a constant level [22].

Carbohydrates

Diabetic diet should consist of 40-50% of energy from carbohydrates with a low glycemic index (GI less than 50). The glycemic index of foods affects the content of simple sugars, their preparation, the fragmentation of food, fruit maturity and the use of fats. In addition to the glycemic index found in products we also distinguish glycemic load of the products. In 1997 the concept of glycemic load (GL) was introduced. It is a numeric value, taking into account both the quality and the amount of carbohydrates in the product. It is calculated by multiplying the quantity of the carbohydrates contained in food in grams. The result should then be divided by 100. The higher the product's GL, the greater the increase in concentration of glucose can be expected after ingestion. Glycemic load values: a low glycemic load of 10 or less, the average glycemic load between 11-19, the high glycemic index of 20 or less [1]. One gram of carbohydrates provides 4 kcal. Patients with diabetes should eat complex sugars – polysaccharides. Complex sugars are those which include: starch – present in large quantities in rice, cereals, potatoes, legumes, root vegetables, dextrin – obtained from hydrolysis of starch, glycogen – contained in the liver and muscles, cellulose and pectin – indigestible sugar contained in plant food [23]. Monosaccharides should be subject to restrictions. These include monosaccharides – glucose present in fruit, fructose in honey, ripe fruit, galactose – derived from lactose hydrolysis, and disaccharides – sucrose contained in beet and cane sugar, lactose present in milk and maltose derived from starch hydrolysis [23,24]. The recommended intake of disaccharides by diabetics should not exceed 5-10% of the total energy supply. Sucrose as a sweetener should not exceed 20 gm/day. In patients with diabetes with insulin deficiency and impaired hepatic glycogen synthesis the glucose and fructose caused hyperglycemic effect.

A diet rich in fibers improves glucose tolerance and decreases the secretion of insulin. In addition, a high intake of dietary fiber can improve other

metabolic parameters, may protect against the onset of cancer lesions and diverticulosis of the colon. The fiber contained in food is a heterogeneous group of complex polysaccharides that are resistant to digestive enzymes of the gastrointestinal tract. There is fiber soluble and insoluble in water. Cellulose, hemicellulose and lignin bind water and toxic metal ions and are insoluble in water (products, wheat and bran) [10,25,26].

Fats

Fats should provide 30-35% of the energy value of the diet. 1 g of fat is 9 kcal. Saturated fats should be less than 10% of the energy value of the diet. In patients with elevated LDL-C ≥ 100 mg/dl fats should be less than 7%. Monounsaturated fats should provide 10-15% of the energy value of the diet. Polyunsaturated fats should constitute approximately 6-10% of the energy diet including omega-6 fatty acid: 5-8%, and omega-3 fatty acid: 1-2%. The cholesterol content in the diet should not exceed 300 mg/d. In patients with elevated LDL-C ≥ 100 mg/dl, this amount should be reduced to 200 mg/d. To lower LDL cholesterol levels, reduce the share of saturated fat in the diet and/or replace them with carbohydrates with a low IG index and/or monounsaturated fats [20]. The intake of trans fatty acids should be minimized.

Saturated fats are also found in palm oil and coconut. A diet high in saturated fat promotes the development of atherosclerosis by an increase in total cholesterol and LDL [23,27].

Unsaturated fats are of plant origin and comprise of mono and polyunsaturated fatty acids. A diet rich in monounsaturated fatty acids (MUFA), most often used in the form of olive oil, may improve insulin sensitivity, glycemic control and the level of HDL cholesterol and may reduce the level of triglycerides in the serum. Therefore, in accordance with the position of the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD), diabetics can consume monounsaturated fats without restrictions.

A diet rich in polyunsaturated fats (PUFA) found in corn oil: sunflower and saffron, lowers total cholesterol and LDL cholesterol while lowering HDL.

Polyunsaturated fatty acids of the omega-3 are contained in fish oil, and effectively reduce the risk of coronary heart disease in diabetic patients through [23];

- a. reducing the production of VLDL,
- b. decrease in blood pressure,
- c. reducing platelet aggregation
- d. prolongation of bleeding time.

Proteins

The proportion of energy derived from protein in the diet should be 15-20% with the ratio of animal protein to vegetable protein of 1:1. Proteins are made up of amino acids linked by peptide bonds and provide about 4 kcal/g [20].

Animal proteins have high biological value, because they contain a suitable amount of essential amino acids, in contrast to vegetable protein characterized by low biological value [28].

Vitamins and minerals

Supplementation with vitamins and micronutrients in patients in whom there was no deficiency is not advisable [15].

Alcohol

Alcohol consumption by diabetic patients is not recommended. First, the patient should be advised that alcohol inhibits the release of glucose from the liver and therefore its consumption can promote the development of low blood sugar (hypoglycemia). Allowed standard consumption of pure ethanol (converted) is in an amount not greater than 20 g/d. for women and 30 g/d for men. It is forbidden for patients with dyslipidemia (hypertriglyceridemia) to consume alcohol, because it increases the disorder of lipid and fatty liver disease, neuropathy, and pancreatitis. Alcohol provides about 7 kcal/g of substance, not food, but it is an additional source of energy that must be taken into account when laying nutritional plan [28-30].

Sodium in the diet

No more than 5000-6000 mg/d should be consumed by healthy people, by people with moderate hypertension \leq 4800 mg/d, and by people with hypertension and nephropathy \leq 4000 mg/d [20,31].

Sweeteners

In patients with type 2 diabetes the maximum sucrose intake is 20 g/day, so as not to worsen the metabolic control. Patients especially obese, with hypertriglyceridemia, or poorly compensated metabolic diabetes should avoid eating large amounts of sucrose [32]. Fructose has been prohibited by the PTB from use by diabetic patients, due to the addition by the producers of glucose-fructose syrup in many products.

Xylitol is the alcohol obtained from the xylose present in vegetables and fruits. It provides about 4 kcal/g. It is absorbed slowly and does not increase the blood glucose and triglyceride levels.

Sorbitol (mannitol) is an alcohol obtained by the reduction of glucose or fructose. It provides 4 kcal/g. It is slowly absorbed. Sometimes induces an increase in blood glucose in patients with metabolic misalignment.

Saccharine is a sweetener, which is used mostly for patients with no calories, it is changed in the body and is expelled unchanged with the urine.

Cyclamates are thirty times sweeter than sucrose. They are devoid of the caloric content.

Aspartame is a sweetener a hundred times sweeter than sucrose. It provides about 4 kcal/g substance. However, it is unstable in solution and when heating food. Safe dose of aspartame is 50µg/kg/day. An important factor affecting the proper nutrition in diabetes, especially in overweight people, is to modify their behavior. Diet alone is often associated only with food ration on the plate. It includes, however, besides ration, the suitable culinary treatments and technology in food preparation and proper eating.

2.2 DIETARY TREATMENT OF ELDERLY PATIENTS

Institute of Medicine (IOM) published a list of references for nutrients in people aged 51-70 and over 70 years. The current recommended protein intake for adults is 0.8 g/kg per day. It also recommended the intake of 1.0-1.6 g/kg per day, and even 25-30 g of high-quality protein at every meal in the elderly [14,33].

Regarding the percentage of carbohydrates and fats in the diet of elderly, they are the same as in younger adults [14].

The recommended intake of fiber in patients aged >50 years is greater than in the above-mentioned group. Some older people avoid pro-

ducts with high fiber because of the difficulty in chewing and digestion. If the demand for dietary fiber in an amount of 21 g/day in women aged more than 50 years and 30 g/day in men aged more than 50 years is not satisfied, you should gradually increase it, eliminating intolerance symptoms: increased amount of gas, bloating, abdominal pain and diarrhea [34].

The recommended fluid intake in adult men and women does not change with age. Fluid intake should be monitored for proper hydration and prevention of hyperosmotic syndrome. Problems concerning the movement and use of toilets may discourage people to reach for fluids. However, modifications to the above guidelines may be necessary, if there are coexisting diseases such as e.g. presence of nephropathy [14].

A significant difference in terms of the nutritional objectives concerns the reduction of body weight in younger people who are overweight and obese, and the elderly. In the latter an aggressive weight loss treatment is not recommended. Older people with diabetes should not be encouraged to reduce body weight and introduce calorie restriction diet [14,22].

In the elderly the nutritional habits have long been shaped. Dietary recommendations, which lead to a reduction in choice of foods, or use long methods and conditions for preparing and eating meals can be rejected [26,25,27]. For the elderly the meals may be the greatest pleasure in the everyday routine. Therefore, drastic changes in the current feeding of the patient should not be made

SUMMARY

Diabetes is a disease whose symptoms may initially be invisible and undetectable. Type 2 diabetes is also called adult-onset diabetes. According to physicians, the main reason for its occurrence is an unhealthy lifestyle, and above all obesity.

The elderly are characterized by the presence of metabolic disorders which are affected by body fat, insulin resistance, hypertension, and disorders of water. The basis for the treatment of type 2 diabetes is a behavioral treatment aimed at proper diet and exercise. Behavioral treatment of elderly people with type 2 diabetes can sometimes prove to be a serious obstacle. Elderly patients often have fixed habits and food preferences. Eating foods may also be one of the greatest pleasures in the daily

routine of life of older people. You should also keep in mind that too much restriction in the diet can lead to skipping meals and, consequently, lead to malnutrition.

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