Seminars for Physicians

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Summary

Introduction. Type 2 diabetes mellitus is a global public health problem. Altered dietary habits and modern lifestyle lead to obesity and insulin resistance, the main factors in the pathogenesis of this disease. Dietary Regimens for Patients with Type 2 Diabetes. There is no consensus on the most appropriate dietary therapy for glycemic control and long-term weight loss. Individualized approach, based on metabolic needs and goals of each patient, is recommended. Because of the relationship between the body mass and insulin resistance, permanent weight loss is the strategy recommended to obese patients with diabetes. Permanent weight loss is achieved by reducing caloric intake and increased physical activity.

Issues. Although careful nutrition is an essential control element of this disease, most patients with type 2 diabetes mellitus consider dietary recommendations too restrictive and reject them, leading to poor glycemic control in over 60% of patients. The feeling of frustration and hopelessness, fear that they will be deprived of their favourite foods, fear that treatment of diabetes will negatively affect their social life, lead to escapism into forbidden foods. Potential solutions. Understanding, knowledge, attitudes and beliefs of patients about the importance of dietary regimens in the treatment of type 2 diabetes mellitus are crucial in the new approach of education and public health policies that will support wider acceptance of dietary habits and lead to a better control of the disease. Providing more quality time between doctors and patients for better communication is part of this comprehensive approach which is the only way to stop the global epidemic of type 2 diabetes.

Key words: Diabetes Mellitus, Type 2; Diet, Diabetic; Weight Loss; Life Style; Nutrition Therapy; Health Knowledge, Attitudes, Practice; Motivation; Energy Intake; Recommended Dietary Allowances

Sažetak

Uvod. Dijabetes melitus tipa 2 je globalna epidemija savremenog sveta i veliki javnozdravstveni problem. Izmjene dietetske navike i stil života savremenog čoveka doveli su do ogromnog porasta gojaznosti u populaciji koja dovodi do insulinorezistencije, dominantnog faktora u patogenezi ove bolesti. Islhrana osoba sa dijabetesom tipa 2. Ne postoji konsenzus o dietetskom tretmanu koji najviše odgovara kontroli glikemije i dugoročnom gubitku težine. Preporučuje se individualizirani pristup koji odgovara metaboličkim ciljevima svakog pojedinca. Zbog odnosa telesne mase i insulinorezistencije, trajni gubitak težine jeste strategija koja se preporučuje gojaznim osobama sa dijabetesom kroz smanjeni ukupni kalorijski unos i povećanu fizičku aktivnost. Problemi. Iako je pažljiva dietetska praksa esencijalni element kontrole ove bolesti, većina pacijenata smatra dietetske preporuke pretežnim i odbija da ih se pridržava, dovodeći do loše kontrole bolesti u preko 60% slučajeva. Osećaj frustracije i beznađa; strah da će im omiljena hrana biti oduzeta; da će biti hendikepirani nečesto stvari u društvenu životu i da su promene potrebne za uspešan tretman dijabetesa nedostojne vode čestim „bekstvima u zabranjenu hranu“. Moguća rešenja. Upućenost pacijenta, njegov va znanja, shvatanja i verovanja o ulozi ishrane u tretmanu ove bolesti od ključnog su značaja u novom pristupu edukaciji i javnozdravstvenim politikama koje bi išle u prilog prihvatavanju dijabeteskih navika i postizanju bolje kontrole bolesti. Dovoljno kvalitetnog vremena koje lekar može da posveti svakom pacijentu deo je ovog sveobuhvatnog pristupa kojim se jedino može zaustaviti globalna epidemija dijabetesa tipa 2.

Ključne reči: dijabetes melitus, tip 2; dijabeteska dijeta; smanjenje težine; stil života; nutritivna terapija; znanje o zdravlju stavovi, shvatanja i verovanja.

Introduction

Public health aspects

Type 2 diabetes mellitus (T2DM) is a global public health problem, and the number of patients in the world is reaching epidemic proportions [1]. The World Health Organization (WHO) estimated that, globally, 422 million adults aged over 18 years were living with diabetes in 2014, out of which over 95% with T2DM [2]. The number of patients worldwide is constantly
rising, and 80% live in low- and middle-income countries [3], Serbia being among them. According to data from 2012, 1.5 million deaths were caused directly by diabetes, and 2.2 million were the result of cardiovascular and renal complications caused by diabetes; thus, diabetes is on the high eighth place among the leading causes of death in both sexes, and 43% of all deaths caused by elevated values of serum glucose that occur in the age group of 20 – 69 years [2]. It has been estimated that the direct annual cost of diabetes to the world is more than 827 billion dollars [4]. According to data from the Institute of Public Health of Serbia, in 2014 there were 710,000 registered persons with diabetes or 12.4% of the adult population, which corresponds to the prevalence rate of 9.9% [5] and represents the highest rate in the region [6].

Pathogenesis of T2DM and lifestyle changes

Type 2 diabetes mellitus represents a potential end of a long and extremely complicated path that starts with insulin resistance, caused by chemical substances from adipose tissue, reducing the sensitivity of liver cells and skeletal muscles to insulin effects [7]. Most patients with T2DM are overweight, obese or have predominantly abdominal distribution of visceral fat, and the body composition in T2DM patients is the main cause of insulin resistance [8]. Due to insulin resistance, the level of glyceremia is kept within normal ranges, but at the cost of overloading the pancreas and secretion of large quantities of insulin [7]. This temporary equilibrium is called prediabetes, and the American Diabetes Association (ADA) defines it as fasting glucose of 5.6 – 6.9 mmol/l and values of glycated hemoglobin (HbA1c) of 5.7 – 6.4% [8, 9]. Prediabetes is a potentially reversible condition. The reduction in body weight will unload the pancreas of excessive insulin secretion and thus the development of T2DM will be avoided. Otherwise, over time, pancreas loses the ability to maintain fasting glyceremia within normal limits causing excessive secretion of insulin that leads to diabetes [7].

Global epidemic of T2DM can be attributed to changes in dietary habits, lifestyle changes, and aging population [7, 10]. The traditional dietary patterns have disappeared, while foods with high energy density, large portions with highly refined carbohydrates, unhealthy fats and sugary drinks are becoming the dominant model [10, 11]. These eating habits lead to obesity, that is the driving force of this global disease [11]. According to statistics from 2014, an astonishing 43% of population older than 18 years is overweight or obese. Changing patterns of everyday life and reduced energy consumption contribute to the pathogenesis of obesity [10, 11]. The “thrifty gene” hypothesis is an excellent interpretation of the impact of lifestyle transition on the T2DM epidemics. “Thrifty genes” are genes, which enable individuals to efficiently collect and process food to deposit fat during periods of food abundance in order to provide for periods of food shortage. The same genes, in conditions of food abundance, make the population vulnerable and prone to diabetes. The adaptive genetic response has become maladaptive, contributing to obesity that is a base for insulin resistance and development of T2DM [7]. On the other side, if a person manages eating habits and physical activity properly, in spite of genetic risk, it is unlikely that the disease will develop [2, 7].

Dietary regimens for persons with T2DM

Diet and management of diabetes

For many people with diabetes, the most challenging aspect of the treatment is determining what to eat [12]. Although careful dietary regimen is one of the essential elements of controlling diabetes, WHO data indicate that approximately 80% of patients with T2DM refuse or avoid dietary recommendations [13]. Researches indicate that eating habits contribute with 51% to overall variations of HbA1c in the population of diabetic patients [14], whereas non-adherence of patients with T2DM to dietary recommendations remains high and ranges from 48% to 74% [15]. Negative attitudes of patients with T2DM towards dietary recommendations inevitably lead to poor management of the disease. The results of the international prospective study conducted in 28 countries show that almost 60% of patients with T2DM have poor management of the disease [16], that is HbA1c ≥ 7%, which is the recommended limit for avoiding micro-vascular complications of this type of diabetes [17]. In the neighbouring Croatia, only 21.6% of people with T2DM have good control of glyceremia, while 87% of patients are obese or overweight [18].

Dietary recommendations for persons with T2DM

Although medical nutrition therapy and lifestyle modifications are considered cornerstones in the treatment of T2DM, there is still no consensus on the most appropriate dietary treatment for glycemic control and long-term weight loss [19]. The primary goals of dietary intervention in T2DM is adoption of eating habits to achieve long-term energy balance, optimize body weight, reduce cardiovascular risk factors and prevent complications [1, 12]. Therefore, 2017 recommendations of ADA emphasize individualized approach based on metabolic needs and goals of each patient [12]. However, individualized approach means there are also some general principles to follow.

The key dietary approach in the management of T2DM is limited intake of calories in general, not of specific foods [1]. Since almost three out of four
persons with T2DM are overweight, and over 50% are obese, and due to the relationship between the body mass and insulin resistance, the ADA recommends a weight loss strategy to obese patients with diabetes [12]. Reduced intake of calories and increased physical activities decrease blood sugar even before the body weight loss, thus relieving the pancreas and reducing insulin resistance [7]. Significant weight loss is associated to T2DM remission. The risk of developing T2DM after a significant loss of body weight remains reduced even if lost weight is partially regained under the influence of psychosocial factors and physiological changes (compensatory hormonal changes that influence weight gain) [20]. Current nutrition recommendations do not support any particular dietary approach for reducing excess weight, but different dietary patterns with overall quality diet, resulting in reduced energy intake [10, 12].

The total amount of carbohydrates is a key strategy in achieving glycemic control in T2DM [1]. Although carbohydrates with lower glycemic index further improve glycemic control [1, 19], the choice of carbohydrates should be seen primarily in terms of direct impact on energy balance and body weight [12]. Consequently, sucrose and other sugars should not be strictly avoided, but seen from the perspective of overall energy balance and replaced with other carbohydrate sources [1]. Although fibers of plant origin slow down the absorption of carbohydrates, consumption of whole grains is not associated with improved glycemic control in T2DM patients, and in its latest guidelines ADA does not recommend increased fiber intake i. e. more than in general population [12]. Fructose (“free fructose”), potentially is not harmful, unless exceeds 10% of the total caloric intake due to the relatively slow digestion and absorption [10]. The intake of “sweets for diabetics” must also be limited, because they almost always contain a large amount of fructose which turns into lipids in the liver, leading to dyslipidemia, visceral obesity and insulin resistance [11]. Low calorie sweeteners reduce the total caloric intake, do not have glycemic effect whatsoever, but there is not enough evidence of their effects on the reduction of body weight and metabolic risk factors [10, 12].

Data on the ideal amount of fat in the diet of persons with diabetes is still controversial. Type of fat that is consumed, from the viewpoint of the objectives of the metabolic control and cardiovascular risk, is much more important than the total amount of fat. A large number of randomized controlled studies of patients with T2DM suggest that a diet rich in monounsaturated fats can improve the glycemic control and lipids in serum [12]. In the cohort study of women with diabetes, higher intake of fish and omega-3 fatty acids with a long chain was associated with a lower incidence rate of coronary artery disease [21]. A large study including 12,536 people with diabetes or at potential risk of diabetes has shown that omega-3 polyunsaturated fatty acids used as a supplement did not lead to a reduction of mortality and rate of cardiovascular accidents [22]. Therefore, the ADA does not recommend omega-3 polyunsaturated fatty acids as a supplement neither in patients with diabetes, nor in general population; the ADA recommends their higher intake through foods [10, 12].

Dietary barriers perceived by patients with T2DM

Studies show that patients with T2DM prefer pharmacological treatment rather than strict dietary modifications that lead to weight loss [19, 23]. Reasons for this are complex and include:

Lack of knowledge and understanding

Patients feel they cannot keep in mind all the information they receive and feel adrift [19]. Embracing the information may be reduced, especially at the time of diagnosis [24]. Repeating the information given during the first visit may be necessary, so patients would not make wrong choices of food [19]. Some of the most common problems that patients are facing include [1, 19]:

• lack of understand the concept of carbohydrates (carbohydrates are just sugar and starchy foods, but biscuits, snacks and corn rolls are free to consume; brown bread (not necessarily whole grain) is better for glycemic control and its intake is allowed in larger quantities;

• issue of portion size (especially the quantity of bread);

• should fruits be consumed, which ones and how many per day;

• should patients be more concerned about sugars than fats (diet should have low level of carbohydrates, while the quantity and ingredients of fats are irrelevant).

All aforementioned indicates that effective and useful dietary guidelines are necessary for patients with T2DM, with developed cultural directions and involvement of patients [25]. The health professionals recommend the term “blood sugar” to be replaced by the term “blood glucose” in order to avoid visualization of sugar in food that is directly transferred into the bloodstream, which contributes to poor conceptual understanding of carbohydrates [1].

Negative perception towards the new dietary regimens

The feeling that some foods are limited, but tempting sometimes, in patients with T2DM cause negative emotions like frustration and hopelessness. There is a fear that they will be deprived of their favourite foods [14], and that successful treatment of diabetes requires unattainable lifestyle changes (7). The sense of deprivation, often accompanied by a sense of loss of control (21) leads to an increased tendency towards uncontrolled consumption of “forbidden foods”, emotional overeating, and self decep-
tion, later followed by increased stress [1]. Therefore, a new dietary regimen should be presented as an opportunity to improve health, without associating it with deprivation and dietary restraint [1, 25].

**Obstacles associated with motivation factors**

Results of dietary changes are not immediately visible; therefore, compliance with new dietary regimen can be difficult. Motivation is influenced by the objectives and priorities: evaluation of good glycemic control versus freedom from everyday burdens of T2DM is a question of personal choice [24]. Although knowledge of the risk that the disease brings can act as a motivating factor, individuals perceive these risks differently (believing that they personally will not be affected) [24]. Lack of short-term consequences, that is characteristic of T2DM, acts as a demotivating factor. Individuals have no symptoms, so they are not motivated to change [19]. Losing the illusions, due to the lack of change and the abandonment of the dietary regimen is evident especially in patients who see blood glucose control as the primary therapeutic target. A high level of blood glucose, despite dietary changes is the reason for giving up [1, 19]. Some patients do not consider T2DM a serious disease, so they do not see the need to change their diet, believing that taking prescription medications is sufficient and that “they do not have to starve themselves” [7, 19]. Responsibility towards family is considered a motivational factor [25].

**Psychosocial obstacles**

Food plays an important role in maintaining social relations and there is a considerable pressure to eat with too many temptations and often with inadequate offer for patients with T2DM which is a major challenge for adherence to certain dietary requirements [19]. In these situations, family members and friends have different, positive and/or negative, impact on behavior related to the dietary regimen [1, 19]. Although family support is generally considered a significant factor that influences changes in lifestyle, only 13% of diabetic patients stated that their family has made any change beneficial for them [24]. Very often the needs of people with T2DM are secondary in relation to the preferences of other family members, so their food choices at home can be challenging [19, 25]. On the other hand, overprotective families show that they have little confidence in the abilities of patient [24] of patient and increase their sense of stigma [26].

A significant problem exists among the elderly population, who make half of the patients with T2DM. Memory loss and cognitive problems reduce the compliance to dietary advices [3]. Older people with long-established dietary habits frequently discard dietary recommendations with limited food choices. Food can be one of the greatest pleasures of their daily routine [27]. With the increasing duration of disease, adherence towards dietary recommendations declines which can be explained by the fact that these patients simply grow tired complying to dietary regimens [3].

**Solution must be comprehensive**

Diet significantly contributes to the control of glycemia and body weight in diabetic patients. A reduced intake of carbohydrates, especially simple sugars, as well as replacing saturated fat with unsaturated, represents great advantage in improving these parameters, thus reducing the risk of cardiovascular complications and mortality.

Subjective knowledge, attitudes and beliefs which patients adhere, in regard to importance of dietary regimen in treatment of T2DM, are influenced by many factors, including dietary advice patients receive from health professionals, other patients, literature and media. Unfortunately, modus operandi in everyday life is often different. The study conducted in 2011, by the American Academy of Nutrition and Dietetics, reveals that the most popular sources of information on nutrition are television, newspapers and the internet; however, information obtained from the dieticians, doctors and nurses are considered more credible [28].

**Necessities for organizational changes in the healthcare system**

Moving away from fragmented healthcare and using an integrated management of diabetes in primary health care, assures health promotion, prevention and treatment of this disease [2]. Population-based screening for T2DM in Serbia, as an important strategic decision, was not accompanied by analysis of existing resources able to carry the increased workload caused by screening itself or new cases. Thus, due to the workload of doctors and short time they really spend “face to face” with their patients, the messages about healthy eating and physical activity are often left unsaid. Recommendations of health professionals are highly valued, considered credible, and even the smallest advices that patients receive are of great importance [28].

**A new approach to patient education**

It has been proven that patients appreciate more the visual experience of food model and portion sizes, which are much easier to adopt, opposed to approaches that include discussions about healthy food [1]. Training in groups also turned out to be a cost-effective strategy [2]. Successful education, beside changes related to knowledge, needs to introduce a change in beliefs, understanding and way of thinking about diabetes [1]. In order to achieve that, it is necessary to introduce research about the experiences, problems and obstacles that people with T2DM encounter while managing the disease. Many attitudes about dietary regimens are geographically, culturally, religiously, traditionally, and otherwise specific. Most of the attitudes, knowledge and recommendations that we use originate from research done.
within Western countries and are specific for that given area. Unfortunately, researches on knowledge, attitudes and problems that patients suffering from T2DM in Serbia encounter, almost do not exist. Dietary choices must be individual, but patients must be familiar with all moderators, specific to this given area, which affect these choices.

**Changes in public health policy**

Public health policy should create a healthy food environment, through favoring the production and distribution of healthy foods, promoting socially responsible business as well as additional taxation of highly refined food products.

**Conclusion**

Type 2 diabetes mellitus represents a global epidemic of the modern world that can be attributed to altered dietary habits and lifestyle of the modern man leading to obesity as the main cause of this disease. It is known that a careful diet practice represents an essential control element of this disease. Despite the knowledge, most patients with type 2 diabetes mellitus continue to be non-adherent towards dietary recommendations, which leads to poor control of the disease in over 60% of patients. Understanding, knowledge, attitudes and beliefs of patients about the importance of dietary regimen in the treatment of type 2 diabetes mellitus are crucial in the new approach of education and public health policies that should support wider acceptance of dietary habits and lead to a better control of the disease. Providing doctors enough quality time with their patients is part of this comprehensive approach, which is the only way to stop the global epidemic of type 2 diabetes.

**References**


