

## PROPHYLACTIC ASSORTMENT DIVERSIFICATION OF FOOD FOR DIABETICS

Iusan L.

Terentieva G., Caragia V., Gordeeva V.

„Practical Scientific Institute of Horticulture and Food Technology”–Chişinău, Moldova

**Iusan L.: e-mail: [lira.7772@rambler.ru](mailto:lira.7772@rambler.ru)**

**Abstract:** Diabetes like syndrome is one of the most frequent diseases of endocrinological system of the human body. The increase in the number of diabetes patients in the world is scientifically proven, and this fact requires in the future development of directions for functional and preventive products. One of the ways to achieve prophylaxis and prevention of the disease is by using special purpose food products. Such products may be obtained by substituting sucrose sweeteners (sugar substitute). Currently, fructose is considered to be one of the perspective sweeteners. The Institute of Scientific and Practical Horticulture and Food Technologies, namely The Food Technology Laboratory conducted a number of scientific researches, the results of which was the development of technologies for the production sucrose as blended drinks with added pumpkin-based fructose. Drinks with fructose enable to wide the range of products for diabetics, designed both for those in the initial stage of diabetes, and for insulin-dependent people

**Key words:** fructose, diabetics, food, patients, diagnosis.

Diabetes mellitus is one of the most common diseases of the endocrine system of the human body. The prevalence of diabetes is increasing worldwide. The number of diabetics is increasing steadily, and every decade – doubled. According to the World Health Organization in 2025, the number of diabetics in the world will reach 380 million, it accounts for 6% of the world population. By 2025, the prevalence of diabetes is already at 10%, and in some populations with a risk factor – 20%.

Currently registered in Moldova over 60,000 explicit diabetics. At the same time, the number of people with latent diabetes – 2.3 times greater. Thus, the total number of people with diabetes more than 100,000. In the structure of diabetic patients 20% are children and adolescents with diabetes mellitus type 1, 80% – persons older than 40 years with diabetes type 2. [1]

Currently, throughout the civilized world today is being fought with type 2 diabetes, a disease that takes on the character of noninfectious epidemic. The danger of it is the fact that 70% of patients with Type 2 diabetes are unaware that they are sick. Diagnosis is usually made when the patient's body is in irreversible changes. Diabetes is not curable, but it is not a sentence. Despite all the difficulties of treatment and severity of diabetes is a disease called more than "disease" and "lifestyle". Indeed, compliance with certain lifestyle allows patients with diabetes (especially type 2 diabetes) to fully compensate their disease for a long time. Special lifestyle of diabetes involves: regular exercise (exercise stress), special diet, constant monitoring of blood glucose levels.

Scientific evidence shows that in many cases of diabetes and its complications can be prevented by – healthy eating. The basic principle should be based on what food for diabetics – selection of products so as to maintain blood sugar levels close to normal and prevent weight gain.

In the 60–70s of the food industry could not imagine a wide range of products for people with diabetes. a wide range of pastries and canned fruits and vegetables (biscuits, chocolates, sweets, candy, jam) is made from ordinary foods by replacing sugar with natural sweeteners. At the same time, doctors recommended to use natural sweeteners (xylitol, sorbitol, fructose, stevia) [2].

Nowadays, the most promising raw material for the production of anti-diabetic products considered fructose. Fructose was first obtained from honey and originally called "levulose." Fructose or levulose, fruit sugar, refers to the group of monosaccharides, which are called ketose. Fructose is found in many fruits (apples, pears, tomatoes, etc.). Fructose which long time was sweet substance and was applied only in the pharmacological remedy or for patients with diabetes, in recent years became ordinary raw materials in the food industry. Fructose used in the production of a wide variety of drinks, food of milk, canning fruits and vegetables, as well as for the preparation of pastries, desserts, ice cream, fruit salads, jams and preserves. By means of fructose it is possible to reduce effectively caloric content even the most tasty sweets. Moreover, fructose has another valuable feature – it intensifies the flavor of fruits and berries, which is especially important in the preparation of juices, jams, berries and fruit salads. Fructose is appreciated the ability to strengthen the human immunity, to stabilize level of sugar in blood, and also to reduce risk of caries and emergence of diathesis at children.

Compared to sugar, fructose has significant advantages that stem from the fact that these substances are assimilated by the body in different ways. It is called the "slow sugar", fructose absorbed by cells without requiring the hormone insulin and causing no – sugar – hormonal splash [3].

At diabetes at average and heavy degree, fructose can bring benefit, however and it shouldn't consume in a large number. So for children with diabetes, the amount of fructose consumed in food should not exceed 0.5 grams per kilogram of body weight per day. The diet of adult patients with diabetes, the daily consumption of fructose dose should not exceed 0.75 grams per kilogram of body weight. It should be noted that in recent years abroad selection of foods with fructose significantly increased; drinks, juices, nectars, fruit jelly, marshmallow, soufflés, waffles, bread, breakfast cereals (porridge and muesli), yogurt, ice cream desserts. [3]

In Moldova practically is not made products with fructose Thus, the development of foods with fructose becomes relevant for the food industry in our country. In Moldova, more than half produced canned products accounted from juices, nectars and drinks. Thus drinks with fructose will expand the range of products for diabetics.

### **Research methods**

Research and development of technology drinks with fructose conducted in laboratory conditions Scientific – Practical Institute of Horticulture and Food Technology.

The development of new anti-diabetic products for people having diabetes, it is necessary to take into account the glycemic index of foods. The glycemic index is a reflection of the body's response to the comparison product with reaction to pure glucose, which is the glycemic index of 100. Glycemic index of all other products are compared with the glycemic index of glucose, depending on how quickly they are digested. When the item has a low glycemic index, which means that when it is used the blood sugar level rises slowly. The higher the glycemic index, the faster rising blood sugar levels after

consuming the product and the higher will be a one-time blood sugar levels after eating.

In developing the beverage formulations, preference is given to raw materials with a lower glycemic index. According to Table Montignac such raw materials are pumpkin, tomatoes, apples, peaches, apricots, which glycemic index is 20–30 units. Given the above formulation was developed blended drinks, which was the basis of a pumpkin [4,5].

Fructose added to beverages in order to sweeten. When calculating its concentration syrups from the data that the sweetness of sucrose, fructose exceeds 1.2 – 1.7 times, as well as take into account the pumpkin flavor combinations and raw fruit.

Designed drinks were evaluated by the following parameters: the mass fraction of soluble solids – refractometry method according to GOST 2856.2, total acidity, according to GOST 25555.0, active acidity (pH) – in accordance with GOST 26188, sugar content – GOST 8756.13, fructose – on differential method Goltgofa.

#### Results of the study

As a result of research conducted by the Laboratory of Food Technology have developed blended a variety of drinks: Pumpkin – apricot, pumpkin – Apple – cherry plum, pumpkin and peach, pumpkin and apple.

In beverages normalizing main indicators are – a solids content, pH and titratable acidity of the medium[7]. The results are shown in Table 1.

**Table 1.** Physicochemical indicators of drinks

	Product name	Mass fraction of dry substances,%	Mass fraction of titratable acids (in recalculation to theapple),%	pH	Mass fraction of reducing sugars%	Mass fraction of fructose%
1	Pumpkin – Apricot	10,5	0,32	4,1	8,05	3,56
2	Pumpkin – apple alychevy	11,7	0,28	4,0	8,35	3,94
3	Pumpkin–peach	11,4	0,35	4,0	8,66	3,42
4	Pumpkin–apple	10,8	0,36	4,0	8,2	3,15

Evaluation of the organoleptic characteristics and sampling was carried out on workers tastings. Major advantage of the developed drinks – the maximum preservation transof the natural color of raw materials. They ranged in color from light yellow to yellow. The taste – a harmonious, pleasant, sweet and sour. The positive is that the taste is not felt pumpkin flavor that not everyone likes.

From the table it is visible that the solids content of the beverage ranges from 10.5 to 11.7%. Acidity of the samples ranged from 0.28 to 0,36%, pH drinks almost the same and is within 4.0–4.1. The content of reducing sugars and fructose are respectively 8.05 – 8.66 and 3.15 – 3.94.

Calculation of the energy value showed that it is low-calorie beverages with the contents from 32,2 to 35 kcal on 100 g of a product. As can be seen from the table when using 200g beverage consumption of fructose will make up to 10 grams, which is 20% of its daily needs.

Thus new drinks with fructose can be used in various food categories of the population, including patients with diabetes. This range will expand production of vegetable drinks using local herbs.

#### **Conclusions**

1. Is developed the technology for producing of 4 beverages with fructose, based on the pumpkin puree.
2. The developed range of beverages will expand production of vegetable drinks using local herbs. Canned food can be embedded in any enterprise for processing fruit and vegetable raw materials without additional equipment production lines.
3. New types of drinks with fructose can be used in various food categories of the population, including patients with diabetes.

#### **References**

1. Национальная программа по профилактике и борьбе с сахарным диабетом на 2011–2015 годы. Постановление Правительства N.549 от 21 июля 2011г. (MonitoruloficialN. 122–127 от 29 июля 2011г.)
2. Д.Н.Болтик, Р.Н.Кавелич, И.И. Кондратова Создание диабетических кондитерских изделий с использованием фруктозы РУП БелНИИ пищевых продуктов, г.Минск, 2002
3. Тимофеева В. Н.Консервы из тыквы Изв. вузов. Пищ. технол.. 1996, N 5 – 6, с. 85–86. Рус.
4. Касьянов Г. И., Гиш А. А., Лопатин С. Н., Комплексная переработка тыквы Изв. вузов. Пищ. технол.. 1998, N 4, с. 93–94. Рус. RU. ISSN 0579–300
5. Каишаури Н.Тыква – лучшее сырье для производства напитков Пробл. аграр. науки. 2000, N 11, с. 119–121. Груз.; рез. рус., англ