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MINERAL COMPOSITION STUDY OF COMPLEX ADDITIVES OF BAKERY PRODUCTS WITH ANTI-DIABETIC APPOINTMENT

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Abstract

In Kazakhstan, one of the most consumed products are baked goods, in connection with the increase in their range with anti-diabetic appointment is an important task, because increasing every year in Kazakhstan people with diabetes.

One of the efficient ways to solve this problem is to develop a high technology manufacturing bakery products anti-diabetic action using a set of Herbal Supplements to solve this problem requires the use of biotechnology and electrical methods in the production of complex additives used in bakery products anti-diabetic action. The authors have developed the technology of bakery products anti-diabetic action using a set of Herbal Supplements (rose, Jerusalem artichoke, stevia leaf, celery root) using biotechnology and electrical methods.

The mineral composition of the reference bread with addition of the complex supplements 5, 10, 15 and 20% by weight of water. According to studies established that these minerals (sodium, silicon, phosphorus, sulfur, chlorine, potassium, iron) in wheat bread with the addition of the complex supplements with 15% replacement of water dominate over the other samples. It was found that due to the consumption of bread with the addition of complex supplements with 15% water changes a person covers the daily requirement of phosphorus, chlorine and iron more than the norm of the daily intake of minerals. It is noted that the sulfur - the necessary structural component of some amino acids are also included in the composition of insulin and is involved in its formation. Need approximately 1 g per day. The daily requirement for sulfur by 8%.

Studies have shown that wheat bread with complex supplements with 15% replacement of water contains rich mineral composition. On the basis of laboratory tests obtained wheat bread with complex supplements with 15% replacement of the water produced by biotechnological methods and electro contains rich mineral composition and provides a bakery anti-diabetic action.

Keywords: complex supplements, mineral composition, the daily need, bread, electrophysical methods, biotechnological methods, minerals, anti-diabetic action.

Introduction

Prevention and treatment of diabetes mellitus (DM) are still valid. Currently, the prevalence of diabetes in the world is from 2 to 5%, and in the age groups over 60 years reaches 10.8% [1]. According to the Ministry of Health, the country suffers from diabetes, more than 157 000 people, of which II diabetes type - 92% and the first type - 8%: both lead to serious consequences. According to recent reports in the world about 145 million people suffer from diabetes, and, as predicted by scientists, their number may increase by 2025 to 300 million. DM - endocrine-metabolic diseases, which is based on insulin deficiency. Risk factors for the disease diabetes with hereditary predisposition to it, are long-term abuse of foods containing carbohydrate (sugar, jam, pastries), systematic overeating, obesity, over-nervous system trauma, infectious diseases, atherosclerosis, hypertension, acute and chronic pancreatic disease. An integral part of diabetes treatment is diet therapy. Patients with diabetes need to build power with the physiological needs of the body, depending on body weight, age, physical activity, occupation and place of residence, and also depending on the severity of the disease and the presence of comorbidities and complications. Diet should contain an increased amount of B vitamins and ascorbic acid. The protein content shall be within the physiological norms, but his administration should be individualized. The diet should include the limitation of animal fats and carbohydrates by reducing consumption of sugar and sugar products. At present, the market for goods has improved markedly diabetic destination [1]. There are new sweeteners and confectionary products (cookies, cakes, candies) made on their basis. This is mainly foreign-made products, and often they contain sugar substitutes do not have permission from the Ministry of Health for use in Kazakhstan. Also known adverse side effects of some of them - sodium cyclamate, acesulfame, and saccharin sodium. In Kazakhstan there are only a few companies that produce products for diabetics. However, their relatively limited range, and, moreover, these products are quite expensive and are not available for most patients. Especially small selection of baked goods (MKI) diabetic destination and their quality does not always meet the medical requirements.

The food industry has a strong interest in the use of non-traditional vegetable raw materials in the production of bakery products. One such plant is Stevia, a sweet taste which is caused by substances glycoside forms, organized under the title "stevioside" (200-300 times sweeter than sugar). These components have been isolated and studied in 1955, but only became widely used now. Stevia is widely used in Japan, China, Thailand and USA. According to studies Stevia contains up to 10% sweet glycosides, 11-15% protein, vitamins, including vitamin C, and minerals. This product has

no calorific value, will not increase the blood glucose level. Known for its use in the treatment of inflammatory diseases of the stomach, as an antitumor agent, as a means of strengthening blood vessels, normalizing the liver, gallbladder. Outwardly stevia syrup used in the treatment of dermatitis, seborrhea and other skin diseases [1]. Other vegetable raw materials containing a unique carbohydrate complex is Sweet. Especially valuable presence in Jerusalem artichoke essential amino acids, dietary fiber, pectin, nitrogenous substances, vitamins B and C. The use of artichoke in diabetes mild and moderate severity normalizes carbohydrate metabolism and lowers by 30-40% the level of cholesterol in the blood [1]. No less promising product is celery. Celery refers to a group of plants with high content of vitamin C. Also, celery found in folic acid in an amount of up to 3.0 mg/kg and about 8 free amino acids, among them, such as asparagine, tyrosine. The protein is 30-50% of crude protein. According to the literature [2] mentioned celery contains potassium, sodium, calcium, phosphorus, and a small amount of iron and copper.

The presence of celery in a large number of alkaline salts improves digestion of protein foods, regulation of metabolism and the maintenance of acid-base balance in the body, protecting it from premature aging. Celery helps to whet the appetite, a beneficial effect on the nervous system and sleep, it is used in medicine for the treatment of obesity.

A favorable combination of minerals and a high content of potassium promotes the excretion of uric acid. Celery cells enhance the gastrointestinal system, accelerates the excretion of cholesterol and thus protects a person from atherosclerosis. Celery contains volatile, which reduces the activity of spoilage microorganisms, protecting the human body from various diseases [2].

From these data it can be concluded about the rich nutrient content of celery.

Other vegetable raw materials, have medicinal properties arose. On the merits of food and medicinal properties of rosehip knew back in the IV century BC in ancient Greece. In Russia XVI-XVII centuries offer expeditions to collect wild rose as a medicinal plant in the Orenburg steppe. Thus, the therapeutic properties of wild rose are time-tested and results.

Useful properties of rosehip due to its chemical composition [3]. Rose hips are a real treasury of vital substances - vitamins, pectin, organic acids, minerals. The content of pectic substances depending on the species and varieties, the range from 1.5 to 6.2%. Phenolic compounds that determine the value of P-vitamin rose, represented by catechins, leucoanthocyanins, phenolic acids, anthocyanins, flavonols. The predominance leucoanthocyanins (0.6-2.1%) and catechins (0.4-1.9%) results in a high biological value fruits [4]. Rosehip - a wonderful plant, all parts of which can help in various diseases. For example, the roots can help with heart disease, disorders of the stomach and so on. The stalk of rose hips can be used with radiculitis, etc. Flowers of artisanal plants can help in inflammatory processes, but

the berries are used to enhance immunity, as well as diabetes. They are well lower blood pressure and cholesterol levels, as well as dramatically improve the health of people suffering from insulin deficiency. The presence of a large number of different dog rose vitamins, especially vitamin C, trace elements and helps to maintain the body in diabetes in tone. All his substance beneficial effect on the body by fatigue that is of great help for patients with diabetes of all kinds. Since diabetes suffer certain organs in the human body, such as the kidney, then to improve their performance and, if necessary, removal of kidney stones can be applied drug, the main component of which is the root of the hips [4].

Thus, due to the presence of organic acids, vitamins, amino acids in vegetable raw materials (Jerusalem artichoke, celery root, rose hips, stevia leaf) the authors developed a set of Herbal Supplements (Jerusalem artichoke, celery root, rose hips, stevia leaf) with the use of the use of biotechnology and electrophysical methods, which improves food and biological value of bakery products. The use of these raw materials in the creation of supplements in high technology in the production of bakery products antidiabetic action is actual direction.

Materials and Methods

The object of the study are bakery antidiabetic action. Base 'test regional laboratory of engineering profile "Constructional and biochemical materials" RSE on PVC "South-Kazakhstan State University im.M. Auezova "is equipped with modern instruments to determine the mineral composition of bakery products with the addition of an anti-diabetic action of the complex Supplements 5-20% by weight vody. Eksperimentalnye studies were performed using Inductively coupled plasma mass spectrometry with kadrupolnym mass analyzer Varian 820MS (USA).



Figure1-Inductively coupled plasma mass spectrometry with a quadrupole mass analyzer from Varian 820MS (USA).

Inductively coupled plasma mass spectrometry Varian ICP-MS designed for the measurement of various elements in the samples of substances and materials, solutions, food, soil, etc. Scope - geology, metallurgy, chemical industry, nuclear power, environmental control, food industry and scientific research.

Description: Inductively coupled plasma mass spectrometry Varian ICP-MS are stationary laboratory instruments, consisting of an ion source, mass analyzer, the registration system and automatic control system based on IBM - compatible computer.

The ion source consists of a horizontal burner, inductively coupled plasma and a system for sampling ions from the plasma and feeding them into the mass analyzer.

The ion source is equipped with a special system that creates a parabolic electrostatic field in the plasma region - "ion mirror" that guides the ions to the mass analyzer entrance. In this case, uncharged particles and photons pass freely through the ion mirror. The separation of ions according to mass to charge ratio is carried out using a quadrupole mass analyzer, which enables rapid scanning of the spectrum.

Signal detection is performed using a multiplier which provides a dynamic range up to 10⁹. Managing the process of measurement and processing output data in devices carried by an IBM-compatible computer with a special software package.

Results and Discussion Studies

Grain products are a staple of the human diet. Bread contains many nutrients necessary for man; Among them, proteins carbohydrates, vitamins, minerals, dietary fiber.

Whole bread almost completely covers the need for iron derive a significant portion of manganese and phosphorus.

A major shortcoming of mineral complex bread is low content of calcium and its unfavorable ratio of phosphorus and magnesium. In the bread contained an insufficient quantity of potassium, chromium, cobalt and other elements. Therefore, increasing the value of the mineral is also an urgent problem [5].

Lack of plants and minerals in food determines a flaw in minerals in the body. Therefore, the shortfall can be compensated with dietary supplements. The aim of our study was to evaluate the mineral composition in the production of bakery products for diabetic patients with the use of additives from vegetable raw materials (stevia, Jerusalem artichoke, celery root, rose hips).

As a base used wheat bread. The additives were added Supplements complex prepared by the use of biochemical and electrophysical method. Baked wheat bread dough method using complex Supplements humidity 42.0% of flour, water, yeast and salt. In experimental embodiments in an amount of 5, 10, 15 and 20% by weight of water.

Sample 1 - the bread with addition of the complex supplements 5% by weight of water.

Sample 2 - the bread with addition of the complex supplements 10% by weight of water.

Sample 3-bread with addition of the complex supplements 15% by weight of water.

Sample 4-bread with addition of the complex supplements 20% by weight of water.

Control -bread from flour of first grade.

The results showed that the complex supplements may be used in the process dough method: An Introduction to the amount of 5-20% by weight of water increases the accumulation of acidity, which creates prerequisites for reducing the duration of fermentation test, fermentation test is more evenly, resulting in an increase in the index of the porosity of the finished bread.

The obtained data suggest the possible use of vegetable raw materials for the production of diabetic destination. The authors found that physico-chemical and organoleptic properties was selected wheat bread with complex supplements with 15% water change. We have studied the mineral composition of the reference bread with addition of the complex supplements 5, 10, 15 and 20% by weight of water.

The variety of functions of minerals in the human body (regulation of water metabolism, maintenance of acid-base balance, secretion of digestive glands, participation in the process of hematopoiesis, etc.) determines the need for inclusion in the general assessment of the nutritional value of bread its mineral value [6].

Table 1 shows the mineral composition of wheat bread with the addition of complex supplements.

Table 1 - Mineral composition of bread with the addition of complex Supplements.

Indicators name	Control	Sample1	Sample 2	Sample 3	Sample4
samples weight, g	18,1698	20,2080	24,0356	15,9608	14,9670
Ash of samples, rp	0,2223	0,2570	0,3214	0,200	0,1880
Ash, %	1,223	1,27	1,337	1,253	1,256
Na, g /kg	2,93	2,96	3,07	2,94	2,93
Mg, g /kg	0,26	0,31	0,35	0,27	0,32
Si, g /kg	0,02	0,02	0,02	0,025	0,02
P, g /kg	1,06	1,22	1,34	1,07	1,27
S, g /kg	0,061	0,07	0,05	0,08	0,07
Cl, g /kg	2,79	2,68	2,77	2,84	2,47
K, g /kg	0,84	0,93	0,92	0,93	0,88
Ca, g /kg	0,18	0,19	0,21	0,19	0,21
Fe, g /kg	0,01	0,01	0,007	0,06	0,01

Table 2 presents the daily demand for minerals according to the literature [7].

Table 2 -Daily demand for minerals.

Minerals	Daily nutrition
Na, g	3
Mg, g	400
Si, mg	30
P, mg	800
S, g	Not installed
Cl, mg	750
K, g	3
Ca, g	400
Fe, mg	15

Conclusion

According to the results of Table 1, it shows that these minerals (sodium, silicon, phosphorus, sulfur, chlorine, potassium, iron) in wheat bread with the addition of the complex supplements with 15% replacement of water dominate over the other samples.

Due to the consumption of bread, it covers the daily requirement of sodium, magnesium, silicon, potassium, calcium, respectively, 97.7; 0.07; 83.3; 31; 0.05%. Phosphorus, chlorine and iron cover the daily needs of man more than the norm, respectively, at 33.75; 378; 400%.

It is noted that the sulfur - the necessary structural component of some amino acids are also included in the composition of insulin and is involved in its formation.

Need approximately 1 g per day [8]. The daily requirement for sulfur by 8%.

Studies have shown that wheat bread with complex supplements with 15% replacement of water contains rich mineral composition.

On the basis of laboratory tests, wheat bread with complex supplements with 15% replacement of water produced by biotechnological and electrical methods, contains rich mineral composition, and provides a bakery antidiabetic action.

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