

Confectionery Products for Therapeutic and Preventive Purpose with Medicinal Herbs Uzbekistan

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ABSTRACT: The aim of the study was to develop a recipe and technology for making lingering cookies, gingerbread with medicinal herbs: peppermint (*Ménthapiperíta*), camel thorn (*Alhagipseudalhari*), stevia (*Stevia rebaudianaBertoni*), growing in Uzbekistan.

The chemical composition of the phytoadditives used has been studied. It was revealed that such flour products as cookies and gingerbread are very popular among the population of Central Asia. However, in the range of these products there are very few therapeutic and prophylactic products, especially for patients with diabetes mellitus.

It has been established that the addition of powders of medicinal plants in dosages from 0.5% to 2.0% has a positive effect on the quality of finished products. The products were distinguished by good porosity, pleasant smell and taste, additionally enriched with vitamins, microelements to a level corresponding to human physiological needs.

An increase in the concentration of powders up to 2.5% or more leads to the appearance of a slight bitterness in taste, a slight darkening of the crumb of the products and a deterioration in its porosity structure.

The use of plant powders slows down the process of staling, lengthens the shelf life, preventing the process of mold formation.

The authors consider it possible to use medicinal herbs: peppermint (*Ménthapiperíta*), camel thorn (*Alhagipseudalhari*), stevia (*Stevia rebaudianaBertoni*), growing in Uzbekistan in the production of lingering biscuits and gingerbread for therapeutic and prophylactic purposes while maintaining satisfactory organoleptic and physico-chemical characteristics ...

Keywords:Flour confectionery, cookies, gingerbread, therapeutic and prophylactic confectionery, medicinal herbs, herbal supplements, peppermint (*Ménthapiperíta*), camel thorn (*Alhagipseudalhari*), stevia (*Stevia rebaudianaBertoni*).

INTRODUCTION

Confectionery is one of the important and favorite components of the diet of children and adolescents, but most of them are low in vitamins, minerals, dietary fiber, the deficiency of which in children's nutrition is a serious problem in our country [1].

Studies carried out by the Institute of Nutrition of the Russian Academy of Medical Sciences revealed a deep deficiency of vitamin C (3.5-6 times less than the physiological norm), B vitamins (B1, B2, B6) in more than 50% of the examined children. Insufficient supply of folic acid was found in 36% of children (in the northern regions, the deficit reaches 64%); vitamins of group E - in 47% (in some regions it is 87%). The majority of the child population of the CIS countries has a reduced concentration of calcium, iron and other micronutrients, including fluorine, zinc, iodine and, especially, an essential trace element - selenium, which is an important element of the body's antioxidant defense. Deficiency of dietary fiber reaches 50% [2,3].

In this regard, in recent years, more and more attention in the confectionery industry has begun to be paid to the development and production of products for therapeutic and prophylactic purposes, which contain preparations of biologically active substances or natural components that can increase their nutritional value (vegetable and fruit preparations, fruit berry powders, etc.). Medicinal plants are one of the sources of biologically active substances [4,5].

The use of medicinal plants is growing all over the world [6,7,8]. According to the World Health Organization (WHO), approximately 80% of the world's population currently uses herbal medicines directly in teas or with water, milk and alcohol. Although modern synthetic medicines are mainly used in developed countries, the use of herbal medicines has increased significantly. There is a constantly high demand for plant material. It should be noted that most plants are only partly of interest for biotechnology and genetics, and their medicinal potential has not been revealed [9].

Medicinal plants have significant advantages over synthetic drugs: they contain a natural complex of biologically active substances, macro - and microelements, and in the most accessible and assimilable form. Medicinal plants include fruits, berries, vegetables [10].

Object of study –the process of producing flour confectionery.

Subject of study – flour confectionery (gingerbread, cookies).

The purpose and objectives of the study.Development of new formulations of new generation confectionery products with functional properties and balanced composition for dietary and therapeutic-prophylactic nutrition with phyto-additives (peppermint, camel thorn, stevia).

Research methods.Scientific research on this work was carried out using modern conventional and special organoleptic (sensory), physicochemical, microbiological and biochemical methods for studying the properties of raw materials, semi-finished products and finished products.

Statistical processing of the results was performed using correlation-regression analysis in Microsoft Excel 2013 and MathCad 15. [11,12].

One of the essential components of the treatment and prevention of diabetes mellitus is rational nutritional planning, which is due to the most significant fluctuations in blood sugar levels after meals during the day. A diabetic diet is a permanent therapeutic measure associated with certain restrictions on carbohydrate foods in the patient's diet. Therefore, a diabetic diet is a rational planning of nutrition, which allows to normalize not only metabolic disorders, but also to ensure normal physiological processes in the body [13].

Currently, the main principle of rational nutrition planning in diabetes mellitus is the maximum correspondence between the antihyperglycemic therapy regimen and adapted nutrition, i.e. balance between the sugar-increasing effect of food, which consists in increasing blood sugar levels immediately after its intake, and the sugar-lowering effect of prescribed drug therapy [14]. The basic principle of rational nutrition planning in diabetes is the reasoned choice of foods with a low content of easily digestible carbohydrates, i.e. selection of diabetic foods.

With this in mind, we analyzed the segment of the food market for diabetics (Figure 1).

An analysis of the volume of food production for diabetics in Uzbekistan showed that the production of such food is 2-10% of the total food production. It should be noted that in the total volume of production of diabetic products, flour confectionery products are presented in the smallest volume, despite the fact that they are in great demand among consumers.

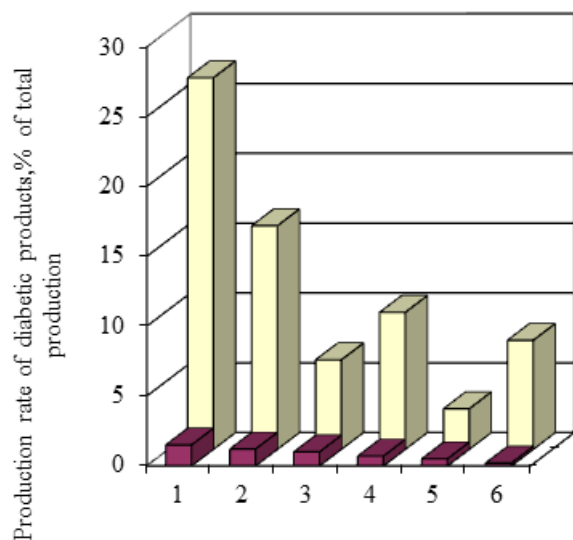


Figure 1: Diabetic food production in relation to total food production:

■ total production;

■ diabetic foods; 1 - bread and bakery products, 2 - milk and dairy products, 3 - sugar confectionery; 4 - meat and meat products; 5 - soft drinks; 6- flour confectionery

It was revealed that the highest interest in diabetic products is shown by respondents aged

40 to 60 years, and the age of a significant part of patients with diabetes mellitus is over 55 years old, whose financial resources are limited.

Considering this, when creating diabetic food products, it is necessary to use inexpensive domestic raw materials and, above all, raw materials of plant origin, as prescription components.

Thus, the analysis of the role of the alimentary factor in the correction of the nutritional status of patients with diabetes mellitus confirmed the urgent need and timeliness of solving the problem of creating high-quality inexpensive domestic diabetic flour confectionery products to ensure the prevention of diabetes mellitus, as well as for their use in medical nutrition.

Residents of Central Asia, when consuming confectionery products, give preference to the following products: cookies, gingerbread cookies, waffles, muffins and rolls (Fig. 2)

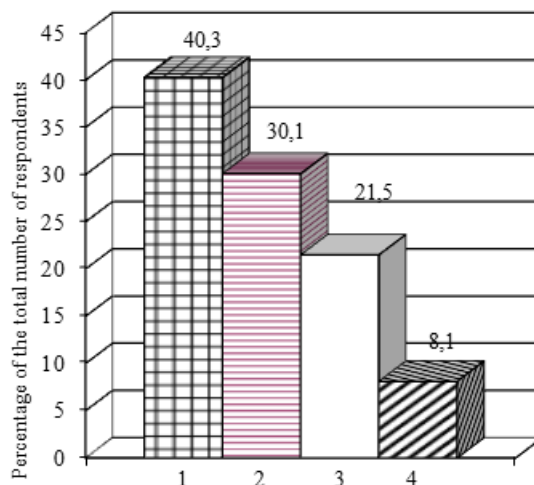


Fig. 2 - Preferences by type of product,% of the number of respondents:

1 - cookies;2 - gingerbread;3 - waffles;4 - muffins and rolls

Thus, it can be concluded that consumers consider cookies and gingerbread to be everyday products, which once again confirms the relevance of the development of formulations of these products for diabetic nutrition.

Figure 3 shows data characterizing the main criteria that consumers are guided by when buying flour confectionery products.

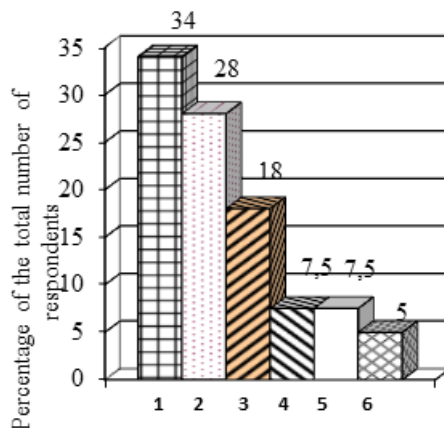


Fig. 3 - Criteria for respondents' choice of cookies and gingerbread:

1 - taste; 2 - price; 3 - manufacturer; 4 - packaging design; 5 - the ability to purchase at a convenient place / at a convenient time;

6 - brand awareness

Taking into account that the created products should have not only high nutritional and physiological value, but also the optimal cost, as the objects of study were taken plant raw materials growing in Uzbekistan (Tashkent, Bukhara region) - peppermint (*Ménthapiperíta*), camel thorn (*Alhagipseudalhagi*), stevia (*Stevia rebaudianaBertoni*).

The objects of the study were dry leaves of stevia (*Stevia rebaudianaBertoni*), collected during the flowering period and dried at a temperature of 55-60°C to inactivate enzymes that destroy diterpene glycosides (Table 1).

Table 1.

Chemical composition and nutritional value of dry stevia leaves
 (*SteviarebaudianaBertoni*).

Indicatorname	Indicatorvalue
Mass fraction, %:	
moisture	10,00-11,00
proteins	9,40-10,70
lipids	0,50-1,90
carbohydrates, including:	26,58-28,19
monosaccharides	0,82-1,14
disaccharides	0,61-1,40
starch	1,57-1,73

dietary fiber	23,58-23,92
extractive substances, including:	37,70-38,10
diterpene glycosides	16,80-17,20
mineralsubstances	8,37-8,75
Mass fraction of vitamins, mg %:	
P	71,24-71,87
B ₂	35,42-36,17
E	22,85-24,24
B ₁	9,45-11,30
B ₆	9,07-10,12
C	7,80-9,53
β-carotene	4,74-5,46
PP	3,46-4,73

From the data in Table 1, it can be seen that dry stevia leaves contain in their composition a number of physiologically valuable ingredients - dietary fiber, vitamins, minerals, as well as diterpene glycosides, which determine their sweet taste, which makes it possible to use stevia as a sugar substitute in the production of flour confectionery.

It was found that in terms of safety indicators, dry stevia leaves meet the safety requirements for additives and products of plant origin [15].

Camel thorn (*Alhagipseudalhagi*) is a thorny shrub, less often a herbaceous perennial plant up to 1 m in height. Common camel thorn - the most famous species of this plant, is widespread in the desert and semi-desert regions of the southeast of the European part of Russia, throughout the Caucasus, Asia Minor and Central, as well as in Siberia and the Urals. It grows on sands, gray soils, wastelands, along the banks of rivers and canals [16,17,18,19,20].

Medicinal raw materials are the aboveground part (grass), collected during the flowering of the plant and after it; fruits and roots are used less.

Studied (Table 2) the chemical analysis of the aerial part of the camel thorn (*Alhagipseudalhagi*). It has been established that this herb contains a rich complex of biologically active substances, including organic acids, essential oils, rubber, alkaloids, vitamins (C, K, group B, carotene), tannins, catechins, flavonoids (rutin), leucoanthocyanidins, coumarins, sterols (cholestenol).

Table 2.

Indicators	The values
Mass fraction of dry substances, %	85,94±0,20
Mass fraction of sugars, %	22,67±0,30
Mass fraction of essential oil, %	0,33±0,01
Mass fraction of alkaloids, %	0,17±0,01
Mass fraction of tannins, %	16,54±0,50
Mass fraction of catechins, %	9,64±0,30
Mass fraction of fiber, %	15,98±0,30
Mass fraction of ash, %	10,70±2,00

Peppermint (*Ménthapiperíta*) contains an essential oil (1.0–2.5%), the main ingredient of which is menthol. In addition, the plant contains tannins (6–12%), bitterness, carotene, betaine, hesperidin, ursolic, oleic and melissic acids, terpene compounds, pinene, and cineole [21].

Table 3 shows the content of nutrients (calories, proteins, fats, carbohydrates, vitamins and minerals) of mint per 100 g of edible part.

Nutritional value and chemical composition of peppermint (*Ménthapiperíta*)

Table 3.

The nutritional value	Vitamins	Macronutrients	Trace elements
Calorie content 70 kKal	Vitamin A (PƏ) 212 mkg	Calcium 243 mg	Iron 5,08 mg
Protein 3,75 gr	Vitamin B1 (thiamine) 0,082 mg	Magnesium 80 mg	Zinc 1,11 mg
Fats 0,94 gr	Vitamin B2 (riboflavin) 0,266 mg	Sodium 31 mg	Copper 329 mkg
Carbohydrates 6,89 g	Vitamin B3 (pantothenic) 0,338 mg	Potassium 569 mg	Manganese 1,176 mg
Alimentary fiber 8 gr	Vitamin B6 (pyridoxine) 0,129 mg	Phosphorus 73 mg	
Ash 1,76 gr	Vitamin B9 (folic) 114 mkg		

Water 78,65 gr	Vitamin C 31,8 mg		
Saturatedfattyacids0,246 gr	Vitamin PP (Niacin equivalent) 1,706 mg		

Research was carried out on the use of peppermint powder in the production of gingerbread, which was added in an amount of 1-3% to the recipe for raw gingerbread [22].

Results of the study of quality indicators of gingerbread cooked with the addition of 1; 2 and 3% of mint powder by weight of flour in the dough are given in table. 4. Products without peppermint powder were used as a reference.

Table 4.

The effect of adding peppermint powder on the quality indicators of gingerbread

Indicators	The quality of gingerbread with the addition of mint powder in %				
	0	1-2	3		
Organoleptic:	Corresponds to this type of gingerbread				
theform					
surface				Unburned, no cracks or bulges	
color				Specific to this product name	Light, with a greenish tint
breakview	Developed porosity, no voids, light crumb	Crumbwithgreensplashes			
tasteandsmell	Peculiar to this type of gingerbread, without foreign smell and taste	With a mentholflavor			
Physicochemical:					
moisturecontent, %	12,0	12,5	13,0		
mass fraction of total sugars, %	15,27	15,36	15,49		
alkalinity, hail	0,50	0,43	0,25		
wetness, %	120,20	183,15	140,91		

The analysis of the data obtained showed that the quality of the gingerbread was not inferior to the control variant when the test powder was added to the dough in an amount of up to 2%

to the flour mass. The products were distinguished by good porosity, pleasant smell and taste, additionally enriched with vitamins, microelements to a level corresponding to human physiological needs.

It was found that an increase in the dosage of more than 3% leads to a slight darkening of the crumb of products and a deterioration of its porosity structure, as well as to the appearance of a weak taste and smell of mint powder.

In the future, when developing formulations for medicinal products with medicinal herbs, the optimal dosage of powders was chosen in the amount of 2% of the flour mass.

To determine the ratio of prescription components, simplex-lattice planning of the experiment was used. The data obtained were used to determine the coefficients of the second degree polynomials characterizing the output parameters. By combining the simplices for the selected indicators, rational dosages of prescription components are established.

The development of recipes for flour confectionery products that meet the specified requirements is to ensure a balanced chemical composition and high organoleptic characteristics. The optimization of the parameters of the developed products was carried out by modeling the formulation using the integral criterion of balance for a wide range of indicators.

The use of medicinal plants with pronounced technological and physiological properties is the basis for the creation of recipes for diabetic flour confectionery products when they are modeled from the position of maximum balance.

Tables 5 and 6 show the developed formulations of diabetic flour confectionery products with medicinal herbs, and in table 7 organoleptic and physicochemical indicators of lingering cookies, in table 8 organoleptic and physicochemical indicators of gingerbread with medicinal herbs.

Table 5
 Herballingeringcookierecipes

Nameofrecipecomponents	Consumption of prescription components in kind, kg			
	"Vanilla" (control)	"Stevia"	"Yantak"	"Mint"
Wheatflour, premium	758,39	766,79	760,51	764,15
Margarine	139,01	133,86	135,13	135,37
Granulatedsugar	75,88	-	-	-
Cornstarch	57,52	77,61	79,38	76,95
Syrup	39,82	38,34	38,34	38,34
Melange	26,70	25,71	25,71	25,71
Steviapowder	absence	26,95	25,37	25,52

Ammoniumsolt	5,27	5,27	5,27	5,27
Drinkingsoda	5,23	5,23	5,23	5,23
Ediblesalt	4,55	4,55	4,55	4,55
Vanillin	0,61	0,61	0,61	0,61
Camelthornpowder	-	-	23,19	-
PeppermintPowder	-	-	-	23,34

Table 6
 Gingerbreadrecipeswithmedicinalherbs

Nameofrecipecomponents	Consumption of prescription components in kind, kg			
	"Road" (control)	"Diabetic"	"Health"	"Raykhon"
Wheatflour, premium	436,7	576,33	568,14	570,58
Margarine	52,4	53,06	53,04	53,10
Granulatedsugar	231,01	a b s e n c e		
Syrup	218,34	221,09	221,01	221,22
Melange	13,1	13,26	13,26	13,30
Burnt	8,74	8,85	8,88	8,86
Steviapowder	absence	34,42	34,70	34,82
Ammoniumsolt	1,31	1,20	1,20	1,20
Drinkingsoda	3,5	3,56	3,56	3,56
Dryperfume	2,66	2,66	2,66	2,66
Camelthornpowder	-		27,61	-
PeppermintPowder	-			27,72

The traditional technological scheme for the preparation of lingering biscuits provides for the stage of dough aging, which is necessary to eliminate internal stresses in the dough and increase its plasticity, but at the same time lengthens the dough preparation process before molding.

It should be noted that during the preparation of the dough, when phytopowders from stevia and other herbs are added, the plasticity of the dough increases with a simultaneous decrease in its elastic properties, and such a positive change in the rheological properties of the dough makes it possible to direct the dough for molding without preliminary aging.

Table 7.

Organoleptic and physicochemical indicators of lingering cookies with medicinal herbs

Indicatorname	Characteristic and value of the indicator			
	"Vanilla" (control)	"Stevia"	"Yantak"	"Mint"
Theform	Correct, without dents and deformations, cookie edges curly			
Surface	Smooth with a clear pattern on the front side, not burnt, no swelling			
Color	Lightgolden	Darkgolden		
Taste	Lightsweetness	Sweet with a pleasant spice flavor		
Smell	Characteristic of the liver, without foreign musty smell.Pleasantaromaofspices			
Brokenview	Baked biscuits with uniform porosity, no voids or traces of imperfection			
Massfraction, %:				
moisture	9,0	9,2	9,4	8,9
fat	12,5	12,2	12,3	12,4
Wetness, %	183	224	230	210
Density, kg / m ³	553	464	468	461

Conclusion

The expediency and effectiveness of using peppermint (Ménthapiperíta), stevia (Stevia rebaudianaBertoni), camel thorn (A. Pseudalhagi) as a raw material for obtaining physiologically functional dietary supplements has been theoretically and experimentally substantiated.

Herbal supplements from Ménthapiperíta, A. Pseudalhagi, Stevia rebaudianaBertoni contain dietary fiber with a high degree of esterification, organic acids and monosaccharides, a complex of biologically active substances, which makes it possible to use it to improve the quality, biological value and preservation of products.

Table 8.

Organoleptic and physical and chemical characteristics of gingerbread with medicinal herbs

Indicatorname	Characteristic and value of the indicator			
	"Road" (control)	"Diabetic"	"Health"	"Raykhon"

Color	Golden	Brown		
Taste	Lightsmackspice s	Sweet, pleasantspiceflavor		
Smell	Neutral, notexpressed	Nicespicesmell		
Theform		Round, even surface with cracks		
Structure		Finelyporous, wellloosened		
Massfraction, %:				
moisture	12,6	12,9	12,8	12,9
fat	5,0	5,4	5,4	5,5
Density,kg/m ³	478	450	445	449
Wetness,%	235	245	248	240

The positive influence of complex herbal phytopowders on the formation of consumer properties and the physiological value of diabetic flour confectionery products was revealed, the terms of their storage were established, ensuring safety and maximum preservation of consumer properties.

It has been established that the addition of powders of medicinal plants in dosages from 0.5% to 2.0% has a positive effect on the quality of finished products. The products were distinguished by good porosity, pleasant smell and taste, additionally enriched with vitamins, microelements to a level corresponding to human physiological needs.

An increase in the concentration of powders up to 2.5% or more leads to the appearance of a weak bitterness in taste and a slight darkening of the crumb of the products and a deterioration in its porosity structure.

When including powders from *Stevia rebaudiana* Bertoni in the recipe for flour confectionery products, it is recommended to exclude the prescription amount of sugar by 100% of its total amount.

The use of plant powders slows down the process of staling, lengthens the shelf life, inhibits the process of mold formation and expands the range of flour confectionery products for therapeutic and prophylactic purposes.

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