IMPACT OF DECORTICATION OF SORGHUM ORYZOIDUM ON GLYCEMIA

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Abstract: The glycemic index (GI) of foods rich in carbohydrates characterize on a scale from 0 to 100 so far as they raise blood glucose levels after their consumption. Foods with high glycemic index (> 70) are digested and easily absorbed into the body, causing a sudden increase and high blood glucose levels. Frequent states of hyperglycemia can lead to metabolic disorders, diabetes and obesity. The paper presents results of experimental determinations of glycemic index of boiled soriz grains and groats compared with glucose.

It was found that the samples investigated aren't aliments with high glycemic index. Obtained data complete bibliographic information available with new varieties of cereal products and their glycemic index to be useful and necessary in developing food rations for different population groups.

Keywords: boiled beans and hulled soriz, glycemic index, glycaemia, glucose.

Introduction

It's known that the human body uses the carbohydrates in the form of glucose as an energy source easily available. For a normal vital activity of human body is indispensable permanently maintaining of the level of blood glucose in physiological limits of 70-100 mg/dl or 3.9-5.6 mmol/l [1; 2]. The accessible glucose use by cells may be food or can be readily available from the reserves of glycogen.

The glycemic index of foods rich in carbohydrates is an important parameter to define the energetic availability of carbohydrates and characterized on a scale from 0 to 100 which raises the level of glucose in the blood after their consumption [3]. With the help of this index are classified as foods containing carbohydrates according to the impact that they have on blood glucose. Foods with high glycemic index (> 70) digest and quickly absorbed in the human body, generating a sudden rise and high glucose levels in the blood. The frequent states of hyperglycemia can lead to metabolic disorders, diabetes mellitus, obesity [4].

Foods with a low glycemic index (<50) leads to gradually increasing blood sugar and insulin levels because they are difficult to digest and absorb the blood. They are also effective in maintaining body weight as controls appetite and offers a feeling of satiety.

Knowing GI for each food separately allows us to choose the ones that cause a moderate increase in blood glucose level, which is the guarantee correct and long vascular functionality [5].

Sorghum Oryzoidum or soriz is an indigenous perspective autochthonous cereal culture whose IG has not been determined so far. The results obtained will complete the existing bibliographic information with new varieties of cereal products and their glycemic index, which will be useful and necessary in the preparation of food rations for different categories of population.

Materials and methods

As research materials were used:

- Soriz grains "Alimentar" boiled (about 120 min);
- Soriz groats (obtained by grinding during 3 minutes) boiled (about 40 min);
- Glucose – GOST 975-88;

The glycemic index of samples tested was determined in vivo by monitoring the level of glucose in the blood of the participants at the experiment before and after the consumption of researched food products, according to ISO 26642: 2010. Glycemic response after the consumption of each product was compared with the stimulated glucose consumption as reference substance [6].

Data obtained were used to build curves glycemic response of participants after drinking samples tested. Surface area under the curve was determined by mathematical method using AutoCAD through the program "Inquiry" that calculates the exact surface area. Finally, glycemic index was calculated as:

$$IG = \frac{Sa}{Sg} 100 \quad (1)$$

where:
GI – glycemic index of the food analyzed;
AS – surface area under the glycemic curve of studied food;
GS – surface area under the glycemic curve of glucose;

Capillary blood sugar of the subjects experiment was determined by method glycosidase -final point to biochemical analyzer "STAT-FAX 1904"[7].

Principle of the method: Glucose, under the action of glycosidase, turns into gluconic acid. H_2O_2 resulting will be decomposed by peroxidase, resulting the reaction involving and pointer Trinder (phenol and 4- amino antipyrine), resulting in a product of condensation in the red coloring with the absorption maximum at $\lambda = 505$ nm. Extinction is directly proportional to the concentration of glucose [8].

Results and discussions

The average glycemic response of the participants at the experiment before and after the consumption of equivalent amounts of carbohydrates (50 g) with glucose, cooked soriz grains or groats are presented in Table 1.

Table 1 *Evolution of glycemia after glucose, soriz grains and groats consumption*

	Time, min							
	0	**15**	**30**	**45**	**60**	**90**	**120**	**180**
Sample	**Glicemia, mmol/l**							
Glucose	3,8±0,8	5,6±1,1	6,8±1,2	5,6±0,9	4,5±0,7	4,9±0,9	4,4±0,6	3,7±0,4
Soriz grains	3,8±0,6	4,8±0,6	5,9±0,9	5,0±0,4	4,6±0,4	4,4±0,4	4,1±0,6	3,9±0,6
Soriz groats	3,8±0,6	4,9±0,8	6,5±0,9	5,5±1,0	4,5±0,5	4,3±05	4,2±0,5	4,0±0,5

The average pre-prandial glycemia of participants in the experiment was in the optimal range of 3.8 ± 0.8 mmol/l. After consuming the samples examined maximum glycemia was reached over 30 minutes. In relation to glucose, cooked soriz groats have determined a higher glycemic response (6.5 ± 0.9 mmol/l.) than boiled soriz grains (5.9 ± 0.9 mmol/l). In the following period was ascertained a slower decrease of blood glucose level participants after eating cooked soriz groats compared with that of the grains. This can be explained by the presence in higher quantities of fibres in integral soriz grains compared with groats, due to digestion and absorption of carbohydrates in blood occurs more slowly [9; 10]. Over 3 hours after consuming the samples studied blood glucose values have come down approximately at the level of initial values.

The glycemic index of cooked soriz grains and groats in relation to glucose is presented in Figure 1.

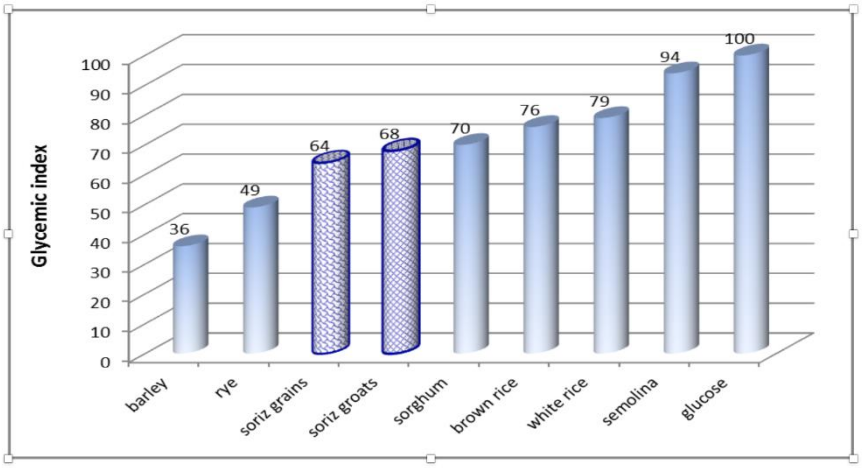

Fig.1 *GI values of sorize grains and groats compared to other cereals*

Thus, the integral soriz, being a hybrid of sorghum, had it close values of IG- respectively 64 and 70. The glycemic index of cooked grains and soriz groats was lower than of cereals as: brown rice (IG = 76), white rice (IG = 79), semolina (IG = 94), belonging to the category of foods with high glycemic index, but higher than that of barley (36) and rye (49), which belong to the group of foods with low GI [11, 12]. Theoretically this can be explained by the different composition of the carbohydrate complexes of cereals, including starches (the degree of gelatinization, the ratio of amylopectin and amylose content etc.), that influences their speed of digestion and absorption [13].

Conclusions

This study for the first time relates the information about glycemic index of soriz grains and groats *(Sorghum Oryzoidum)* and glycemic response after their consumption. The experimental results have shown that the boiled integral soriz caused a slower dynamics of blood glucose in the human body in relation to groats, which allows them to be more effective in reducing the risk of diabetes and cardio-vascular diseases.

Also, the determined values of the glycemic index of cooked soriz grains (64) and groats (68) in relation to glucose demonstrates their class membership food with moderate GI (55-70). Those, even in moderation, are recommended by nutritionists in a healthy diet, unlike foods with high glycemic index (GI > 70) [14].

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