Diabetes Updates

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The reduction of the glycemic index of bread – stick and pasta. The effectiveness of a proprietary fiber mixture

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Introduction

Cardiovascular diseases (CVD) and cancer are the most important cause of death in the world and precisely in the western country; metabolic syndrome, obesity and diabetes are the most relevant risk factors.

The glycemic index (GI) and glycemic load (GL), despite their intrinsic limitations, have been used as markers of the postprandial glycemic and insulin response; their link with metabolic syndrome and cardiovascular disease has been accepted [1].

In recent decades, numerous observational and interventional studies have been conducted regarding the association of GI and GL and satiety, body weight, glucose homeostasis, cardiovascular events and lipid metabolism [2]. A recent large study linked GI and GL in food to a reduction in mortality [3].

The food industry adopts strategies to reduce the amount of carbohydrates available for digestion, digestion rate of food, glucose absorption rate and to increase the rate of glucose removal from blood and to reduce the start digestibility and glucose absorption rate via using different food ingredients and processing methods.

In this study, we evaluate the effect of a specific proprietary fiber mix added to refined wheat flour used for making bread and pastries on GI and GL.

Methods

The first fiber is a resistant non-OGM starch able to improve insulin sensitivity and to generate short-chain fatty acids in the colon (trophic action on the intestinal mucosa and a positive effect on the microbiome); the second fiber is inulin, the perfect stimulant of the healthy microflora involved in the genesis of diabetes and obesity. Bamboo's fiber completes the mix.

Study population

Twenty healthy non-diabetic volunteers (ten men and ten women) aged 30.1 ± 2.1 with BMI of 21 ± 1.6, fasting the night before, ate on different days a test portion of fiber and enriched traditional pasta, fiber-enriched breadsticks, and normal breadsticks. All test meals have 50 gr of available carbohydrates or a 50 gr of glucose in water. The fiber mix was composed of 30% resistant starch, 30% inulin, 30% bamboo fiber. The volunteers were unable to identify the breadstick and pasta modified from the traditional ones. Composition and nutrient content are listed in Table 1.

Table 1

	Cbs*	Fbs^	Cb"	Fb°
Kcal cbs	439	405	356	351
Carboydrates gr (%)	60	60	71,6	69,1
Fat gr (%)	14	9	1,4	1,2
Protein gr. (%)	15	17	12,5	12,1
Fiber gr. (%)	4	11	3	7,8

* Control breadstick ^ Fiber breadstick "Control pasta °Fiber enriched pasta

The fiber product differs from controls only in the higher fiber content. Before and 15', 30', 45', 75', 90' and 120' minutes after the administration of the test meals, the glucose concentrations were assessed by finger – prick blood samples, using a glucometer (Roche diagnostics). For the GI calculation, the areas under the blood glucose curve after the ingestion of each product were compared to the area under the curve after drinking the glucose solution.

The values after the ingestion of fiber breadstick and pasta from all subjects were averaged and compared with those obtained after the ingestion of normal breadstick, pasta and glucose.

The same data were used to estimate the portion of each product corresponding to 50 gr of carbohydrates: 70.50 gr., 80.30 gr, for control and fiber breadstick, 70.50 gr and 72.30 gr. for control and fiber pasta.

Standard statistical tests were used to evaluate difference; Student's test was adopted to evaluate between group differences.

Results

The average glycemic values in 20 volunteers after ingesting 50 gr of glucose and different products are listed in Table 2.

The glycemic curve of the fiber-enriched breadstick shows a significantly lower glycemic peak than the control product and remains significantly lower namely at the 15 ', 30', 45', 75' (p value <0.05).

The glycemic curve values of fiber pasta are significantly lower compared to the normal pasta at the 45', 60',90' (p value <0.05). All areas of bread and pasta under the curve are reduced from 15 to 90 minutes compared to the values after the glucose load (especially for the fiber enriched product).

The GI calculated as the ratio between the area under the curve for each of the four foods and the area under the glucose curve is 78 for the control breadstick, 51 for the fiber breadstick, 46 for the normal pasta and 24 for fiber-enriched pasta. The presence of the fiber mix can effectively reduce the GI in enriched products.

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Table 2

	Minutes							
	0	15	30	45	60	75	90	120
Glucose	84±3	118±2	136±6	125±7	115±6	106±4	103±4	98±4
Bread stick	83±2	110±3	122±5	116±6	103±4	105±3	99±3	99±2
Fiber enriched breadstick	82±2	103±3*	105±3*	104±4*	100±4	93±3*	94±3	94±3
Normal Pasta	83±2	103±2*	112±1*	105±5*	100±4	94±2	96±2	94±2
Fiber pasta	83±2	98±2	98±3	90±3*	84±3*	89±3	89±3*	90±2

* $p \leq 0.05$

Discussion and conclusion

The present study shows that fiber-enriched foods share an excellent glycemic index compared to normal products; this encouraging result confirms the importance of the good use of fibers in the food industry to avoid a strong postprandial glycemic peak.

The recent epidemiological report of the PURE STUDY confirms the importance of adopting low glycemic index products in the diet in order to reduce mortality from chronic degenerative diseases [4], preventing obesity and diabetes [5].

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