



Post-Prandial Responses to Cereal Products Enriched with Barley Beta-glucan

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Abstract

Background: High amounts of soluble (beta)-glucan in barley products may exert beneficial effects on glucose tolerance and blood lipids.

Objective: To investigate the acute postprandial response on plasma glucose, insulin and lipids after consumption of two experimental products made from barley flour enriched with (beta)-glucan in comparison with similar products made from whole-wheat flour.

Methods: A group of 10 healthy volunteers (5 males, age 25.4 (plus or minus) 0.5 y, BMI 22.6 (plus or minus) 0.7 Kg/m²) received at breakfast, in random order and in different days, portions (40g of available carbohydrate) of different cereal products or white bread consumed together with a load of 90000 UI retinol. Products were crackers and cookies made either from barley or whole-wheat flour in a 2 x 2 design, where the two factors were the cereal source of dietary fiber (DF), and the food processing. Barley products supplied 12g DF, 50% soluble, with 3.5 g of (beta)-glucan per portion. Whole-wheat products supplied about 14 g of dietary fiber, mainly in the insoluble form, with negligible amount of (beta)-glucan. Fasting and post-prandial glucose and insulin were evaluated for 180 min after the meals; retinyl-palmitate (RP) and triacylglycerol (TAG) were evaluated hourly over 8 hours. Glycemic (GI) and Insulinemic (II) indexes of products were also assessed, using white bread as reference.

Results: Glucose curves were significantly different between types of food processing ($p < 0.01$) but not between cereal sources of DF ($p = 0.07$). On the contrary, the effect of fiber but not of processing was evident when glucose response was expressed as Glycemic Index (effect of DF $p < 0.01$, effect of processing $p = 0.69$). Individual GI values were 78, 81, 49 and 34 for wholewheat crackers (WWCr), whole-wheat cookies (WWc), barley crackers (BCr) and barley cookies (Bc) respectively. Insulin curves were significantly different both between type of processing and fiber source ($p < 0.001$ for both effects). Again, insulin indices were different between fiber but not between processing ($p < 0.5$ and $p = 0.174$ respectively). RP and TAG daily profiles were not significantly different between the factors studied.

Conclusions: Products prepared from barley flour enriched with (beta)-glucan exhibit favourable responses on glucose metabolism, and particularly on insulinemic responses. In general, cookies responded better to the addition of barley fiber than crackers. Our results highlight the complexity of the effect that barley fiber may exert when added to different food products in reducing postprandial metabolic responses.