

The effects of equal-energy portions of different breads on blood glucose levels, feelings of fullness and subsequent food intake

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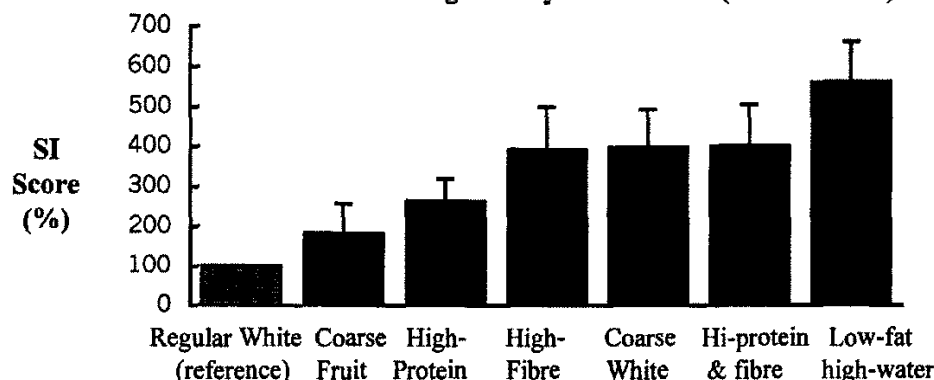
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In order to prevent weight gain and reduce the risk of the diseases of affluence, nutrition guidelines recommend that people consume $\geq 55\%$ of their energy from carbohydrate-rich foods. However, many of the processed cereal products available in Western societies are relatively rapidly digested and easy to overconsume (1). Large and rapid rises and falls in blood glucose levels have been associated with stimulation of hunger and appetite in both human and animal studies. Research to determine the ways in which foods can increase or decrease glycaemia and appetite is of great practical significance. The aim of this study was to compare the effects of equal-energy portions of seven breads, varying in nutrient content and energy density, on glycaemia and fullness (satiety).

A group of 10 healthy subjects consumed equal-calorie portions of 7 breads in random order on different mornings. Finger-prick blood samples and appetite ratings were collected at 15-min intervals over 120 min, after which the subjects' *ad libitum* food intake was recorded. A satiety index (SI) score was calculated for each bread by dividing the area under the 120-min fullness response curve (AUC) for the test bread by the fullness AUC value for the same calorie portion of regular white bread (the reference bread, SI score = 100%). Mean satiety index (SI) scores for the breads ranged from 100-561%. Mean SI scores were positively related to portion size, carbohydrate, and fibre content, and negatively associated with energy density and fat content. The strongest predictors of the SI scores were energy density and portion size ($P < 0.001$). The SI scores were not significantly associated with palatability ratings or glycaemic responses. Individual SI scores were negatively related to both the amount of energy consumed at a test meal immediately after 120 min ($r = -0.88, n = 7, P < 0.01$) and total day energy intakes ($r = -0.29, n = 70, P < 0.001$), thereby confirming the validity of the subjective appetite ratings and the practical potential of SI scores for weight loss diets.

Average satiety index scores (mean \pm SEM)



These results show that the filling powers of apparently similar foods can differ greatly. Food manufacturers may be able to assist consumers' efforts to control weight and blood glucose levels by producing less energy dense versions of palatable foods with high-satiety ingredients (stone ground wholemeal flours, oats, soluble fibres, whole grains, coarse brans, fructose).

1. Holt SH, Brand-Miller JC, Petocz P. Interrelationships among postprandial satiety, glucose and insulin responses and subsequent food intake. *Eur J Clin Nutr* 1996;50:788-97.