

Original Research

Influence of Sourdough Prefermentation, of Steam Cooking Suppression and of Decreased Sucrose Content during Wheat Flakes Processing on the Plasma Glucose and Insulin Responses and Satiety of Healthy Subjects

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Background: Ready-to-eat breakfast cereals (RTE-BC) are eaten more and more frequently by both adults and adolescents, but their nutritional quality is far from satisfactory: they often contained too much sugars and lead to a high glycemic index (GI) which generally contributes to a more rapid return of the feeling of hunger favouring nibbling in the morning.

Objective: To reduce the GI and to improve the nutritional quality of standard wheat flakes (SWF) by adding a sourdough prefermentation step, suppressing steam cooking and decreasing the sucrose content (MWF, modified wheat flake).

Methods: Eleven healthy male volunteers were randomly given, at three separate times, SWF, MWF, and white-wheat bread (WWB, reference food). Plasma glucose, insulin and ghrelin concentrations were measured. The feeling of hunger was evaluated using a subjective rating scale. Starch structure of SWF and MWF was characterised by scanning electron microscopy.

Results: GI of MWF (83 ± 7) was 12% lower than that of SWF (94 ± 9) at 90 min but the effect was not significant. Insulinaemic index of MWF was significantly lower than that of SWF at 90 min (78 ± 6 vs 98 ± 8). Hunger feelings were lower following MWF consumption and were positively correlated ($r = 0.98$; $P < 0.05$) with plasma ghrelin concentrations, for which there was no significant difference between SWF and MWF. Starch granules of SWF were fully gelatinised unlike those of MWF.

Conclusion: Despite its relatively high GI, MWF could provide health benefits by improving the management of hunger feeling in the morning and by moderately improving insulin economy, which could be of interest for type 2 diabetic subjects. GI is not, therefore, the sole parameter reflecting the nutritional quality of cereal products.

INTRODUCTION

Breakfast is an essential meal. Although there are no official recommendations, it is estimated that breakfast should provide at least 25% of the daily calorie intake. Children who eat a balanced breakfast are more attentive at school and have better

mental and physical health than breakfast skippers [1]. Ready-to-eat breakfast cereals (RTE-BC) are eaten more and more frequently by both adults and adolescents, but their nutritional quality is far from satisfactory. They often contained too much sugar and lead to high blood sugar concentrations that do not favour sustained attention at school during the morning [2]. The

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Abbreviations: AUC = area under curve, GI = glycemic index, II = insulinemic index, MWF = modified wheat flake, RTE-BC = ready-to-eat breakfast cereal, SWF = standard wheat flake

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