OBSERVATIONS

Is Aspartame Really Safer in Reducing the Risk of Hypoglycemia During Exercise in Patients With Type 2 Diabetes?

In addition to physical activity and healthy food choices, low-calorie sweetening agents, such as aspartame, are a recommended alternative to sugar for patients with type 2 diabetes in order to obtain a better control of carbohydrate intake and blood glucose levels (1–3). The safety of aspartame has been a controversial issue for quite some time now. This noncarbohydrate sweetener is currently found in over 6,000 food products and beverages throughout the world. At present, its attractiveness as an artificial sweetener in the dietary management of diabetes is related to its ~200-fold sweetening power and the lack of effect on plasma glucose levels compared with sucrose.

We have recently investigated the effect of different macronutrient compositions on plasma glucose and insulin levels during an acute bout of exercise in 14 men with type 2 diabetes. We compared the same subjects in random order in five different conditions: *1*) high–glycemic index sucrose meal, *2*) low–glycemic index fructose meal (both of which are matched for total calories [455 kcal], macronutrient composition, and taste), *3*) aspartame meal (358 kcal), *4*) high-fat/low-carbohydrate meal (also containing 455 kcal), and *5*) fasting. We hypothesized that using fructose or aspartame instead of sucrose would have a lower impact on insulin release and glucose response than a sucrose-sweetened meal.

Contrary to all expectation, the aspartame breakfast induced a similar rise in glucose and insulin levels at baseline than the sucrose meal, even if the aspartame meal had the same taste, and was 22% lower in calories and 10% lower in carbohydrates, with an inferior glycemic index. Indeed, the most dramatic reduction in plasma glucose level occurred in those with the highest 2-h postprandial plasma glucose levels (>8 mmol/l), i.e., after the sucrose, high-fat/low-carbohydrate and aspartame meals (magnitude of decrease of 44, 37, and 34%, respectively; all $P <$ 0.001). However, the fructose meal induced the lowest fall in blood glucose, with a 31% decrease from baseline. An important fall was also observed in plasma insulin levels (78, 75, 73, and 68% for the sucrose, high-fat/low-carbohydrate, aspartame, and fructose meals, respectively; all $P < 0.001$), in contrast to the fasting state where there were no changes.

Moreover, considering that all sweetened meals (sucrose, fructose, and aspartame) in our study had the same taste, we can speculate that aspartame might have enhanced the cephalic phase of insulin secretion evoked by the recognition of the sweet taste, sight, smell, and expectation of food (4,5) and could have potentiated the drop in glucose levels during exercise. Although it has been reported that various forms of carbohydrate intake before exercise is safer for patients with diabetes in the prevention of exercise-induced hypoglycemia, we have reported severe symptoms of hypoglycemia on four occasions following sucrose- and/or aspartame-sweetened meals (6).

Considering the lack of evidence on the aspartame utilization in patients with type 2 diabetes (7–9), we consider that these clinical observations, in a exercise setting, raise important concerns regarding the safety of aspartame as suggested by international guidelines.

ANNIE FERLAND, RD, MSC
PATRICE BRASSARD, MSC
PAUL POIRIER, MD, PHD, FRCPC, FACC, FAHA

From the Institut Universitaire de Cardiologie et de Pneumologie, Hôpital Laval, Université Laval, Sainte-Foy, Québec, Canada.

Address correspondence to Paul Poirier, MD, PhD, FRCPC, FACC, FAHA, Institut Universitaire de Cardiologie et de Pneumologie, Hôpital Laval, 2725 Chemin Sainte-Foy, Sainte-Foy, Québec, Canada G1V 4G5. E-mail: paul.poirier@crhl.ulaval.ca.

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