

Clinical Insights



Stevia Research

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Antihyperglycemic and blood pressure-reducing effects of stevioside in the diabetic Goto-Kakizaki rat.

Jeppesen PB, Gregersen S, Rolfsen SE, Jepsen M, Colombo M, Agger A, Xiao J, Kruhoffer M, Orntoft T, Hermansen K.

Department of Endocrinology and Metabolism, Molecular Diagnostic Laboratory, Aarhus Amtssygehus, Aarhus University Hospital, Aarhus, Denmark.

Stevioside, a glycoside present in the leaves of the plant, *Stevia rebaudiana* Bertoni (SrB), has acute insulinotropic effects in vitro. Its potential antihyperglycemic and blood pressure-lowering effects were examined in a long-term study in the type 2 diabetic Goto-Kakizaki (GK) rat. Rats were fed 0.025 g x kg(-1) x d(-1) of stevioside (purity > 99.6%) for 6 weeks. An intra-arterial catheter was inserted into the rats after 5 weeks, and conscious rats were subjected to arterial glucose tolerance test (2.0 g x kg(-1)) during week 6. Stevioside had an antihyperglycemic effect (incremental area under the glucose response curve [IAUC]): 985 +/- 20 (stevioside) versus 1,575 +/- 21 (control) mmol/L x 180 minutes, (P <.05), it enhanced the first-phase insulin response (IAUC: 343 +/- 33 [stevioside] v 136 +/- 24 [control] microU/mL insulin x 30 minutes, P <.05) and concomitantly suppressed the glucagon levels (total AUC: 2,026 +/- 234 [stevioside] v 3,535 +/- 282 [control] pg/mL x 180 minutes, P <.05). In addition, stevioside caused a pronounced suppression of both the systolic (135 +/- 2 v 153 +/- 5 mm Hg; P <.001) and the diastolic blood pressure (74 +/- 1 v 83 +/- 1 mm Hg; P <.001). Bolus injections of stevioside (0.025 g x kg(-1)) did not induce hypoglycemia. Stevioside augmented the insulin content in the beta-cell line, INS-1. Stevioside may increase the insulin secretion, in part, by induction of genes involved in glycolysis. It may also improve the nutrient-sensing mechanisms, increase cytosolic long-chain fatty acyl-coenzyme A (CoA), and downregulate phosphodiesterase 1 (PDE1) estimated by the microarray gene chip technology. In conclusion, stevioside enjoys a dual positive effect by acting as an antihyperglycemic and a blood pressure-lowering substance; effects that may have therapeutic potential in the treatment of type 2 diabetes and the metabolic syndrome. Copyright 2003, Elsevier Science (USA). All rights reserved.

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