

A Novel Approach for Lowering Postprandial Glycemia

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Introduction

Diabetes continues to explode as a global epidemic with far-reaching implications and social, health, and economic burdens.¹⁻³ Although diabetes and its encompassing symptoms can be altered by diet and exercise, behavioral obstacles can prevent the occurrence of appropriate changes.⁴⁻⁷ An expert panel recently concluded that postprandial hyperglycemia is a risk indicator for micro- and macrovascular complications in both patients with type 2 diabetes and people with impaired glucose tolerance.⁸⁻⁹ A novel but effective strategy for reducing the burden of diabetic complications may include natural plant derivatives that can mimic the action of pharmacological agents.

Natural therapy

Historically, many natural remedies have been used for healing or treating physical ailments. One such natural therapy used as part of the traditional Ayurvedic system of Indian medicine is the root extract of *Salacia oblonga*, a woody shrub indigenous to India and Sri Lanka. This plant extract lowers postprandial glycemia (PPG) by competitive inhibition of α -glucosidase activity within the lumen of the intestinal tract. Salacinol and kotalanol, compounds isolated from *Salacia* extracts, inhibit the action of intestinal

enzymes sucrase, maltase, and isomaltase, similarly to the inhibitory mechanisms of pharmacological agents such as acarbose and miglitol.¹⁰

Extract of *Salacia oblonga*

An ethanolic extract of *Salacia oblonga* (SOE) has been characterized by LC-MS methodology and *in vitro* assays. SOE has demonstrated α -glucosidase inhibition of the intestinal enzymes sucrase and maltase. Additionally, several animal studies have shown the extract's ability to lower postprandial glycemia following a meal of maltodextrin (data on file). This same extract tested negative for genotoxicity. Its toxicity was further evaluated in a 90-day rat feeding study with no treatment-related changes seen in the animals.¹¹⁻¹² With regards to efficacy in human subjects, SOE has performed well. Two studies conducted in healthy subjects tested the effect of SOE on postprandial glycemia when consumed as part of a high-carbohydrate liquid meal.¹³⁻¹⁴ SOE significantly lowered PPG compared with a control meal in both clinical trials. The short-term efficacy of SOE has also been demonstrated in patients with type 2 diabetes. One study tested the dose response of the extract in this specific population with a high-carbohydrate liquid meal; adjusted postprandial peak glucose was lowered by 14% and 22% ($P<0.0001$) and positive area under the curve for plasma glucose was lowered 19% and 27% ($P<0.0001$) respectively for the two doses (240 mg SOE and 480 mg SOE) versus a control meal.¹⁵ A second study demonstrated the efficacy of SOE on PPG by showing its effect when consumed with a carbohydrate-rich pasta meal in patients with type 2 diabetes.¹⁶ A 240-mg dose of SOE consumed along with a pasta meal lowered the positive area under the curve for glucose 19% ($P=0.0002$) and the adjusted peak glucose

by 19% ($P=0.0001$), compared with the pasta meal alone. SOE is an excellent example of a novel ingredient for lowering PPG in people with diabetes.

Indications for SOE or other natural alpha-glucosidase inhibitors

Natural plant extracts such as SOE can be effective complements to traditional medicine. SOE is currently a popular dietary supplement consumed in Japan as a tea beverage or pill/capsule for the treatment of obesity and diabetes. The short-term effects of this plant extract have been tested, but long-term use of SOE may be even more useful. Nutritional therapy with α -glucosidase inhibitors may benefit patients with diabetes beyond lowering PPG. Several long-term studies conducted with α -glucosidase inhibitors reveal a reduction in risk for myocardial infarction or any cardiovascular event, and the STOP-NIDDM trial showed a reduction in body weight, BMI, waist and hip circumference, systolic and diastolic blood pressure, blood triacylglycerols, 2-h PPG, incidence of CVD events and hypertension during a 3-year period following subjects with impaired glucose tolerance randomized to acarbose.¹⁷⁻¹⁹ Given the growing evidence that poor control of PPG is associated with a high all-cause mortality rate, and that postprandial hyperglycemia has negative effects on insulin secretion and sensitivity, novel ingredients that attenuate postprandial glycemia may be significant tools for glycemic control of diabetic patients.²⁰

Conclusions

- Natural ingredients that lower postprandial hyperglycemia can be useful in the dietary management of diabetes and enable more flexibility in meal planning with less risk of hyperglycemia.
- Plant extracts with alpha-glucosidase inhibitory properties may provide less costly options for glycemic control in patients with diabetes.
- Historical and present usage of an extract of *Salacia oblonga* establishes its value as a nutritional adjunct for the management of diabetes.

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