



BLUEBERRIES AND DIABETES MANAGEMENT

A RESOURCE FOR HEALTH PROFESSIONALS
AND THEIR PATIENTS

OVERVIEW

According to the Centers for Disease Control and Prevention, 34.2 million Americans (10.5% of the U.S. population) have diabetes and 88 million people aged 18+ years have prediabetes (34.5% of the U.S. adult population). Approximately 90–95% of those with diabetes have type 2 diabetes,¹ which occurs when the body's cells do not respond to insulin, the hormone produced in the pancreas which helps blood glucose enter the cells. The prevalence of type 2 diabetes is increasing in the U.S. population. As a result of aging, risk factors such as physical inactivity and a high prevalence of being overweight and obese, increase.²

Can blueberries play a role?

The American Diabetes Association® (ADA) notes that fruit can fit into a diabetes-friendly meal plan, help to satisfy a sweet tooth and provide extra nutrition. **Blueberries are a great way to add natural sweetness to your favorite foods including cereal, yogurt, salads and smoothies.** Not only can they help satisfy your sweet tooth, but they provide the added benefit of essential nutrients like fiber, vitamin C, manganese and vitamin K.³ **In fact, including blueberries in your diet may offer health benefits and help manage your diabetes.⁴**

More specifically, researchers at the Stratton Veterans Affairs Medical Center in Albany, New York investigated the effects of blueberry consumption for eight weeks on cardiometabolic parameters in 52 overweight men between the ages of 51 and 75 with type 2 diabetes. In this double-blind, randomized, placebo-controlled

trial, participants were randomly assigned to one of two interventions: either 22 g of freeze-dried blueberries (the equivalent of one U.S. cup/day fresh blueberries) along with their regular diet or 22 g of a placebo powder (matched in energy and carbohydrate content to the freeze-dried blueberries) along with their regular diet. **The results found that consumption of blueberries for eight weeks may beneficially affect cardiometabolic health parameters in men with type 2 diabetes, including hemoglobin A1c (7.1 + 0.1% vs. 7.5 + 0.2%) and triglycerides (179.6 + 10.1 mg/dL vs. 199.6 + 19.9 mg/dL).** While the results cannot be generalized to all populations, they add to the evidence that a dietary intervention with a realistic serving of blueberries may be an effective strategy to improve metabolic factors associated with type 2 diabetes.⁴

Additionally, a recent systematic review and meta-analysis of 18 randomized controlled trials and 12 studies investigated the effects of blueberry intervention on metabolic syndrome risk factors, including blood pressure, anthropometric measurements, and glycemic and lipid profiles. To compare the effects of blueberry supplements (powder, extract, fruit, juice, or frozen) with placebo, the mean differences with 95% confidence intervals were pooled based on the random-effects model. The quality of evidence was classified according to the GRADE approach.

A BOOST OF BLUEBERRIES: FOOD FOR THOUGHT

Blueberries contain vitamins, phytonutrients, and fiber to help support overall health. A consensus report on nutrition therapy for adults with diabetes or prediabetes recommends that people with diabetes and those at risk for diabetes are encouraged to consume at least the amount of dietary fiber recommended for the general public. **Increasing fiber intake, preferable through foods such as fruits and blueberries are a good source of fiber.**⁶ Importantly, data suggests dietary interventions are effective and low-cost ways to improve blood glucose levels, manage weight, and reduce cardiovascular risk factors for people with diabetes.⁷

Meta analyses of the data showed that there are beneficial effects of blueberry supplementation (powder, extract, fruit, juice, or frozen) on various metabolic syndrome risk factors including lipid levels (total cholesterol and low-density lipoprotein [LDL]) and blood pressure markers (diastolic blood pressure). However, well-designed clinical trials with a large sample size are necessary to overcome the limitations in the existing literature to assess the potential clinical benefits of consuming blueberries.⁹

One serving, or a cup of blueberries:

- 1 Is considered one serving of fruit.
- 2 Contains just 80 calories and only naturally occurring sugars.
- 3 Contributes essential nutrients including vitamin C, vitamin K, manganese and phytonutrients called polyphenols.
- 4 This group includes anthocyanins (163.3 mg/100 g), which are compounds that give blueberries their blue color.

WHAT THE SCIENCE SAYS

Dietary Blueberry and Soluble Fiber Supplementation Reduces Risk of Gestational Diabetes in Women with Obesity in a Randomized Controlled Trial

J Nutr. 2021 May 11;151(5):1128-1138. doi: 10.1093/jn/nxaa435.

Dr. Arpita Basu and her team of researchers at the University of Nevada, Las Vegas conducted a randomized controlled trial to investigate the effects of whole blueberry and soluble fiber supplementation on primary outcomes of cardiometabolic profiles in women at high risk of developing gestational diabetes mellitus (GDM). Women (n = 34; mean ± SD age: 27 ± 5 y; BMI: 35.5 ± 4.0 kg/m²; previous history of GDM ~56%; Hispanic ~79%) were recruited in early pregnancy (<20 weeks of gestation) and randomly assigned one of the following two groups for an 18 week intervention: (2 cups [280 g] whole blueberries and 12 g soluble fiber per day) and standard prenatal care (control). The results indicated that blueberry and soluble fiber supplementation may prevent excess gestational weight gain and improve glycemic control and inflammation in women with obesity. However, larger trials are needed that include women with pregestational diabetes and postpartum hyperglycemia to address the role of bioactive-rich foods in reducing complications of pregnancy.

Acute Consumption of Blueberries and Short-Term Blueberry Supplementation Improve Glucose Management and Insulin Levels in Sedentary Subjects

Nutrients. 2021 Apr 25;13(5):1458. doi: 10.3390/nu13051458.

A team of researchers at the Universidad de Valparaíso in Chile recently evaluated the effect of acute blueberry intake in 10 sedentary subjects between 20–35 years old with a normal body mass index. In the study, 1 cup (150 g) of frozen blueberries were consumed together with 150 g of white bread by the subjects and blood samples were collected at 0, 30, 60, 90 and 120 minutes to measure glucose, insulin, and plasma antioxidant capacity. To evaluate longer term effects, one cup of fresh blueberries was provided daily for six days and sample collection was performed at day seven. The study findings illustrate that the acute consumption of blueberries improved postprandial glucose management, likely due to actions on the gastrointestinal tract, while consuming blueberries daily for six days improved insulin sensitivity, probably due to antioxidant and anti-inflammatory effects. Additional studies with a larger sample size should be performed to determine if polyphenol-rich fresh fruits can be a part of the nutritional intervention for glucose management.

Effects of Blueberry and Cranberry Consumption on Type 2 Diabetes Glycemic Control: A Systematic Review

Crit Rev Food Sci Nutr. 2019;59(11):1816–1828. doi: 10.1080/10408398.2018.1430019. Epub 2018 Feb 13.

A group of researchers at the Universidade Federal de Viçosa in Brazil conducted a systematic review of relevant randomized clinical trials (RCTs) to assess the effect of berries (blueberry and cranberry) consumption on type 2 diabetes glycemic control. A total of seven RCTs, involving 270 adults with type 2 diabetes were included. The results found that daily cranberry juice (240 mL) consumption for 12 weeks and blueberry extract or powder supplementation (9.1 to 9.8 mg of anthocyanins, respectively) for eight to 12 weeks showed a beneficial effect on glucose control in individuals with type 2 diabetes. These results indicate a promising use of these berries in type 2 diabetes management, although more studies are required to better understand the mechanisms involved.

Bioactives in Blueberries Improve Insulin Sensitivity in Obese, Insulin-Resistant Men and Women

J Nutr. 2010 Oct;140(10):1764–8. doi: 10.3945/jn.110.125336. Epub 2010 Aug 19.

Dr. April Stull and her team of researchers at the Pennington Biomedical Research Center, affiliated with the University of Louisiana Baton Rouge, evaluated the effect of daily dietary supplementation with bioactives from blueberries on whole-body insulin sensitivity in men and women. Thirty-two subjects who were obese, not living with diabetes, and insulin resistant were randomized to consume either a smoothie containing 22.5 g blueberry bioactives (blueberry group, n = 15) or a smoothie of equal nutritional value without added blueberry bioactives (placebo group, n = 17) twice daily for six weeks. Individuals who consumed a blueberry-containing smoothie were better able to lower their blood glucose in response to insulin than those who consumed the smoothie without blueberries. More cellular mechanistic studies are warranted to explain the specific cellular pathway involved in the improvement of insulin sensitivity that was observed when blueberries were consumed in this study.

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