

Study Shows Tea Can Reduce Risk and Progression of Diabetes

Analysis by [Dr. Joseph Mercola](#)

February 02, 2024

STORY AT-A-GLANCE

- › Compared with those who never drank tea, daily dark tea consumers had a 53% lower risk of prediabetes and a 47% lower risk of Type 2 diabetes
- › Bioactive compounds in dark tea may influence glucose excretion in the kidneys, potentially explaining some of tea's beneficial effects
- › Daily dark tea drinkers had an increase in urinary glucose excretion and reduced insulin resistance
- › Pu-erh, one type of dark tea that's also known as black tea in China, is unique from typical black teas in the U.S; it's produced via microbial fermentation, which may increase its concentration of powerful bioactive compounds
- › Among adults with Type 2 diabetes, replacing one sugar-sweetened beverage a day with tea led to health benefits, reducing all-cause mortality by 16% and cardiovascular disease mortality by 24%

Sipping a cup of dark tea daily could lower your risk of diabetes, according to University of Adelaide researchers, who found the popular beverage may result in better blood sugar control.¹ As the world's most-consumed drink other than water, and one of the oldest known,² tea makes both a healthy and delicious dietary addition.

Pu-erh, one type of dark tea that's also known as black tea in China, is unique from typical black teas in the U.S. It's produced via microbial fermentation, which may

increase its concentration of powerful bioactive compounds, including alkaloids, free amino acid, polyphenols and polysaccharides, leading to antioxidant and anti-inflammatory effects.³

Daily Dark Tea Reduces Diabetes Risk by 47%

The study involved adults with diabetes, prediabetes or normal glucose levels living in eight Chinese provinces. Compared with those who never drank tea, daily dark tea consumers had a 53% lower risk of prediabetes and a 47% lower risk of Type 2 diabetes. Study author Tongzhi Wu, associate professor at the University of Adelaide, explained:⁴

“Our findings hint at the protective effects of habitual tea drinking on blood sugar management via increased glucose excretion in urine, improved insulin resistance and thus better control of blood sugar. These benefits were most pronounced among daily dark tea drinkers.”

In people with diabetes, the kidneys retrieve more glucose, which means less is excreted in the urine, leading to higher blood sugar. Bioactive compounds in dark tea may influence glucose excretion in the kidneys, potentially explaining some of tea’s beneficial effects.

In fact, the study, which was presented at the 2023 Annual Meeting of The European Association for the Study of Diabetes (EASD) in Hamburg,⁵ found that daily tea drinkers had an increase in urinary glucose excretion and reduced insulin resistance. According to Wu:⁶

“These findings suggest that the actions of bioactive compounds in dark tea may directly or indirectly modulate glucose excretion in the kidneys, an effect, to some extent, mimicking that of sodium-glucose co-transporter-2 (SGLT2) inhibitors, a new anti-diabetic drug class that is not only effective at preventing and treating type 2 diabetes, but also has a substantial protective effects on the heart and kidneys.”

Replacing Other Drinks With Tea Lowers Mortality Risk

Among adults with Type 2 diabetes, choice of beverage has a significant influence on health – and making even slight changes could be beneficial. For instance, higher intake of sugar-sweetened beverages, like soda is associated with all-cause mortality and cardiovascular disease incidence while higher intake of tea, as well as coffee and plain water, is associated with lower all-cause mortality.⁷

Even replacing one sugar-sweetened beverage a day with tea led to health benefits, reducing all-cause mortality by 16% and cardiovascular disease mortality by 24%. Replacing one artificially sweetened beverage a day with tea also led to lower all-cause mortality.⁸

In another example from the European Prospective Investigation into Cancer and Nutrition-InterAct study, replacing sugar-sweetened beverages with tea in an amount of 250 grams per day (about 8.8 ounces) was estimated to reduce Type 2 diabetes incidence by 22%.^{9,10}

Many Types of Tea Are Beneficial for Diabetes Prevention

While the featured study involved dark teas like Pu-erh, other types of tea also show potential for their antidiabetic effects. The tea plant *Camellia sinensis* has been used medicinally for thousands of years, and its polyphenolic compounds may affect glucose metabolism and insulin signaling.

Among middle-aged and older women, drinking four cups of tea a day or more was linked to a 30% lower risk of Type 2 diabetes compared to drinking no tea. Another study found drinking six cups of green tea daily reduced diabetes risk by 33%.¹¹

Catechins, which are abundant in green tea, include epicatechin, epigallocatechin, epicatechin gallate and epigallocatechin gallate (EGCG). In animal studies, EGCG enhanced glucose homeostasis and enhanced wound healing in diabetic mice.¹² EGCG

also alleviates insulin resistance, suppresses oxidative stress and regulates mitochondrial function.¹³

A meta-analysis of 17 trials further revealed that in patients with obesity, Type 2 diabetes or high blood pressure, drinking green tea led to reduced levels of fasting glucose, HbA1c and fasting insulin.¹⁴ Green tea may also influence diabetes via its effects on adiponectin and more:¹⁵

“Adiponectin, the key component in the interrelationship between adiposity, insulin resistance, and inflammation, is inversely proportional to the incidence of diabetes in different populations. In a meta-analysis, supplementing green tea was reported to increase the adiponectin concentrations in patients with T2DM, thereby reducing the possibility of diabetes.

Green tea catechins have been shown to actively modulate the activity or expression of several receptors and enzymes involved in the absorption, metabolism transport, and synthesis of carbohydrates.

... Green tea and its constituents have been reported to positively improve several physiological parameters in clinical subjects with diabetes, such as body weight, body mass index, body fat, and lipid profile, thereby improving living conditions.”

Aside from diabetes, these compounds have anticancer effects that may help prevent lung, breast, esophageal, stomach, liver and prostate cancers,¹⁶ along with anti-inflammatory and antioxidant properties.

Researchers at the University of Leeds and Lancaster University also found the EGCG in green tea can help prevent heart disease by dissolving arterial plaque.¹⁷ Other research suggests this compound also has the ability to inhibit amyloid beta plaque formation in the brain, which is associated with Alzheimer's disease.¹⁸

Tea Polyphenols Influence Obesity and Gut Health

Beneficial compounds in tea may help optimize weight and intestinal microbiota, both of which may be implicated in diabetes. Researchers with University of Tsukuba in Japan found, for instance, that drinking oolong tea can help your body burn fat, even while you're sleeping.¹⁹ The study took place over 14 days and engaged 12 non-obese men who drank either oolong tea, caffeine or a placebo at breakfast and lunch each day.

On Day 14, 24-hour measurements were recorded. The researchers found that drinking caffeine or oolong tea raised fat burning by approximately 20% without any effect on energy expenditure. In another review of the literature, researchers identified an increase in insulin activity of at least 15-fold in laboratory fat cell assays with black, green and oolong teas.²⁰ Oolong tea also reduced plasma glucose and is believed to be an effective adjunctive treatment of Type 2 diabetes.

A 2001 study published in the Journal of Nutrition even found that participants who ingested either full-strength or diluted oolong tea burned 2.9% to 3.4% more total calories daily.²¹

Some of tea's antiobesity effects may be due to its beneficial effects on the gut, offering further antidiabetes support. Both green and black tea may alter gut microbes in a way that's beneficial for preventing weight gain and obesity.²² According to the journal *Nutrients*:²³

“Growing evidence suggests that tea polyphenols have an indirect effect on obesity via modulation of the intestinal microbiota and thus acting as a prebiotic supplement.

Several animal trials have reported the significant impact of tea extracts (green tea, black tea, fermented green tea, oolong tea, and Fuzhuan brick tea) on the improvement of healthier gut microbiota, eventually leading to the reduction in body weight in the mice fed a high-fat diet.

The beneficial effect was a result of the inducing of the number of beneficial bacteria, which may be helping in regulating energy metabolism within the body. Moreover, Pu-erh tea also significantly impacted weight loss in the mice fed a

high-fat diet by interfering with the fat accumulation and adipose inflammation by modulating the microbiota.”

Tea Provides a Whole-Body Health Tonic

Black, white, green, oolong and pu-erh teas all come from the *Camellia sinensis* plant and only differ in how the leaves are dried and prepared. However, each offers unique benefits such that when you drink tea, it affects your entire body, including boosting your heart, liver and brain health, bone mineral density and weight control and supporting healthy blood pressure.²⁴

To get an idea of just how many biological functions tea may positively affect, the Journal of Indian Society of Periodontology notes that green tea may be beneficial for:²⁵

Weight loss – EGCG prevents the breakdown of norepinephrine thus causing a rise in metabolism.

Antiaging – Antioxidants in green tea protect the skin from the harmful effects of free radicals, which cause wrinkling and skin aging.

Immunity – Polyphenols and flavonoids found in green tea help boost your immune system.

Cardiovascular disease – Green tea helps prevent heart disease and stroke.

Liver disease – Men who drink more than 10 cups of green tea per day are less likely to develop disorders of the liver.

Cancer – EGCG has been shown to inhibit angiogenesis of tumor cells by stopping the production of angiogenic compounds.

Arthritis – Green tea can help prevent and reduce the risk of rheumatoid arthritis.

Diabetes – Green tea improves lipid and glucose metabolism, prevents sudden increase in blood sugar levels and balances your metabolic rate.

Alzheimer's – EGCG decreases production of beta-amyloid, a protein that forms the plaques in the brains of Alzheimer's patients.

Parkinson's – Antioxidants in green tea help prevent against cell damage in the brain, which could cause Parkinson's, and thus help prevent it.

Cold and flu – EGCG can directly kill bacteria and viruses.

Asthma – Theophylline in green tea relaxes the muscles that support the bronchial tubes, reducing the severity of asthma.

Stress – L-theanine, which is a kind of amino acid in green tea, can help to relieve stress and anxiety.

Food poisoning – Catechin found in green tea can kill bacteria that causes food poisoning and kills the toxins produced by those bacteria.

Human immunodeficiency virus – With human immunodeficiency virus (HIV), EGCG acts as a block to the HIV transport protein on the host cell.

Dental caries – The effects of green tea extract on caries inhibition in hamsters and on acid resistance of human tooth enamel have been suggested by both in vivo and in vitro studies.

Periodontal health – The inhibitory effects of catechin contained in green tea on periodontal pathogens may provide the basis for beneficial effect of daily intake of green tea on periodontal health.

Halitosis – Halitosis is caused mainly by volatile sulfur compounds such as H₂S and CH₃SH produced in the oral cavity. Tea polyphenols have been shown to have antimicrobial and deodorant effects.

Why Loose-Leaf Tea May Be Safer

When choosing tea, be aware that tea bags may be made with heat-resistant polypropylene to prevent the bag from breaking apart in hot water. This means tiny pieces of plastic likely end up in your drink.

Paper tea bags are treated with epichlorohydrin, a chemical to prevent tears, which has been found to be a probable human carcinogen. Epichlorohydrin reacts with water to form 3-MCPD, another possible human carcinogen.

One study found that tea drinkers' daily intake of epichlorohydrin was 55.37 times greater in those using bagged teas than in those using loose teas.²⁶ Rinsing the tea bags, and not steeping for more than two minutes, may decrease some of the exposure, but using loose-leaf tea may provide an overall healthier choice.

Sources and References

- ^{1, 3, 4, 6} [The University of Adelaide October 5, 2023](#)
- ² [FAO, Tea](#)
- ⁵ [SciTechDaily October 3, 2023](#)
- ^{7, 8} [BMJ. 2023; 381: e073406](#)
- ⁹ [J Nutr. 2019 Nov; 149\(11\): 1985–1993](#)
- ¹⁰ [BMJ. 2023; 381: e073406., Discussion](#)
- ¹¹ [Curr Pharm Des. 2013; 19\(34\): 6141–6147](#)
- ^{12, 13} [Nutrients. 2019 Jan; 11\(1\): 39., 6.4](#)
- ¹⁴ [Nutrients. 2023 Jan; 15\(1\): 37., 2.1](#)
- ¹⁵ [Nutrients. 2023 Jan; 15\(1\): 37., 2.1, 2.2](#)
- ¹⁶ [Int J Mol Sci. 2020 Mar; 21\(5\): 1744](#)
- ¹⁷ [Journal of Biological Chemistry May 31, 2018, doi: 10.1074/jbc.RA118.002038](#)
- ¹⁸ [Infectious Agents and Cancer 2017; 12: 36](#)
- ¹⁹ [Nutrients, 2020;12\(12\)](#)
- ²⁰ [Food Science and Human Wellness, 2015;4\(4\)](#)
- ²¹ [J Nutr. 2001 Nov;131\(11\):2848-52](#)
- ²² [European Journal of Nutrition September 30, 2017](#)
- ²³ [Nutrients. 2023 Jan; 15\(1\): 37., 3.1.2](#)
- ²⁴ [Journal of the American College of Nutrition Volume 25, 2006 - Issue 2](#)
- ²⁵ [Journal of Indian Society of Periodontology 2012 Apr-Jun; 16\(2\): 161–167](#)
- ²⁶ [Journal of Food Science and Technology December 6, 2022](#)