

Health Benefits and Chemical Composition of Matcha Green Tea: A Review

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Abstract

Japanese matcha is a type of powdered green tea, grown in a traditional way. Shading of the plants during the growth period enhances the processes of synthesis and accumulation of biologically active compounds, including theanine, caffeine, chlorophyll and various types of catechins. Green tea contains four main catechins, i.e., (-)-epicatechin (EC), (-)-epicatechin-3-gallate (ECG), (-)-epigallocatechin (EGC) and (-)-epigallocatechin-3-gallate (EGCG), of which the latter is the most active and abundant and matcha is their best condensed source. Due to its unique chemical composition and prized flavour, which sets it apart from other tea beverages, it is considered the highest quality tea. Its health-promoting properties are attributed to the high content of antioxidant and anti-inflammatory substances. Studies confirming the high antioxidant potential of tea beverages claim that it originates from the considerable content of catechins, a type of phenolic compound with beneficial effects on human health. Due to its potential for preventing many diseases and supporting cognitive function, regular consumption of matcha may have a positive effect on both physical and mental health. The aim of this review was to compile the health benefits of matcha tea. It is the first such review to be undertaken, and presents its main bioactive compounds in a systematic manner.

Keywords: *Camellia sinensis*; EGCG; catechins; chemical composition; green tea; health-promoting effect; matcha; polyphenols.

Beneficial effects of green tea--a review

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Abstract

Tea is the most consumed drink in the world after water. Green tea is a 'non-fermented' tea, and contains more catechins, than black tea or oolong tea. Catechins are in vitro and in vivo strong antioxidants. In addition, its content of certain minerals and vitamins increases the antioxidant potential of this type of tea. Since ancient times, green tea has been considered by the traditional Chinese medicine as a healthful beverage. Recent human studies suggest that green tea may contribute to a reduction in the risk of cardiovascular disease and some forms of cancer, as well as to the promotion of oral health and other physiological functions such as anti-hypertensive effect, body weight control, antibacterial and antivirasic activity, solar ultraviolet protection, bone mineral density increase, anti-fibrotic properties, and neuroprotective power. Increasing interest in its health benefits has led to the inclusion of green tea in the group of beverages with functional properties. However, although all the evidence from research on green tea is very promising, future studies are necessary to fully understand its contributions to human health, and advise its regular consumption in Western diets, in which green tea consumption is nowadays limited and sporadic.

Green tea, a source of antioxidants and caffeine, has several possible benefits. Research has found that green tea may help alleviate anxiety and stress and enhance memory. It may also reduce high blood pressure and cholesterol.¹²³

There are several types of green tea. You can consume or use green tea in beverages, dietary supplements, and even topical ointments.⁴

1. Alleviates Anxiety and Stress

Green tea has one of the highest concentrations of L-theanine, an amino acid that can alleviate anxiety and stress.¹ One study found that people who took 200 milligrams of L-theanine supplements per day for four weeks had improvements in anxiety, depression, and sleep compared to those who took a placebo (an inactive pill). Keep in mind that this amount is much more than that in a cup of green tea, which ranges from 8-30 milligrams.⁵

2. Helps Protect Against Cognitive Decline

Some evidence suggests that green tea helps protect against certain neurodegenerative diseases, like Alzheimer's and Parkinson's disease. Green tea has a high concentration of antioxidants. Antioxidants help protect against cell damage that raises the risk of these diseases.⁶⁷

Keep in mind that further clinical studies in humans are needed to clarify the effect of green tea on neurodegenerative diseases like Alzheimer's disease.

3. Helps Support Bone Health

Green tea may lower your risk of osteoporosis. This bone disease increases the risk of hip, spine, and wrist fractures. Postmenopausal people have the highest risk of osteoporosis.⁸ Some evidence suggests that the high concentration of antioxidants in green tea may enhance bone formation and protection against bone mass loss.⁹

4. Improves Longevity

Drinking green tea may help support living a healthy, long life. Green tea is a source of polyphenols, or plant compounds that act as antioxidants. Research has found that polyphenols have anti-aging effects. They can decrease inflammation, protect against cell damage, and reduce signs of aging.¹⁰¹¹

The extent to which drinking green tea alone helps extend lifespan is still unknown. Many factors influence longevity, including genetics and lifestyle.

5. Lowers Cholesterol

One review found that green tea helps lower low-density lipoprotein (LDL) and total cholesterol.³ LDL cholesterol is also known as "bad" cholesterol. There are 86 million people aged 20 years and older in the United States with high total cholesterol levels.¹² High cholesterol raises the risk of heart attack and stroke.¹³

6. May Enhance Memory

Research has found that the L-theanine content in green tea may improve memory. One study found that green tea extract improved working memory among 12 healthy volunteers.² Working memory is a type of short-term memory important for comprehension, planning, and

problem-solving. The study only used a small sample of people, so the results are not definitive. More research is needed to understand how green tea impacts memory.

7. May Manage and Prevent Type 2 Diabetes

Green tea may manage and prevent type 2 diabetes. Some evidence suggests that the antioxidants in green tea can reduce insulin resistance.¹⁴ Insulin resistance causes your cells to respond less to insulin. This hormone helps your cells convert glucose (sugar) into energy. Insulin resistance is a major risk factor for type 2 diabetes.¹⁵

8. Might Lower Stroke Risk

Stroke is one of the leading causes of death and disability among adults in the United States.¹⁶ Drinking green tea may help prevent stroke. One study found that moderate amounts of green tea (about 17-34 ounces) daily may reduce stroke risk by at least 21%.¹⁷ It's unclear why green tea lowers stroke risk. The lifestyle habits of green tea drinkers, such as eating a balanced diet, may influence risk.¹⁸

9. Might Support Weight Loss

Green tea is a source of catechins, or an antioxidant that helps break down fat.¹⁹ Catechins may increase your metabolic rate, which helps you burn more calories, such as while exercising.²⁰ Most available research has only examined green tea extract rather than steeped tea. Even so, green tea extract may have minimal effects on weight loss.²¹

10. Reduces Blood Pressure

Hypertension (high blood pressure) is one of the leading causes of heart disease and stroke.²² Green tea may lower blood pressure due to its high antioxidant content. The antioxidants reduce inflammation and dilate (open) your blood vessels, which supports healthy blood flow.

Nutritional Value

Eight brewed ounces of green tea contains the following nutrients:^[23]^[24]

NUTRIENT	AMOUNT	DAILY VALUE (DV)
Calories	2.4	
Fat	0 grams (g)	0%
Sodium	2.4 milligrams (mg)	0.1%
Carbohydrates	0 g	0%
Fiber	0 g	0%
Added sugars	0 g	0%
Protein	0.5 g	1%

Green tea is not a significant source of calories or nutrients per cup. It contains various antioxidants and small amounts of 27 minerals.²⁵ Small amounts of these minerals can add up, depending on your intake.

Some of the trace amounts of minerals in green tea include:²⁵

Magnesium: Helps control blood sugar

Potassium: Keeps you hydrated

Selenium: Supports your immune system

Risks of Consuming Green Tea

Consuming up to 8 cups of green tea daily is safe. One 8-ounce cup of green tea contains 30-50 milligrams of caffeine. Limit your [caffeine consumption](#) to no more than 400 milligrams per day or 300 milligrams if you are pregnant or breastfeeding.²⁶⁴ Too much caffeine may cause side effects like

anxiety, insomnia, and nausea. High doses of green tea may also interact with certain medications that treat heart disease.

Tips for Consuming Green Tea

Here are a few tips to keep in mind, whether you sip your green tea iced or hot:

Be mindful of sweeteners: Women and men should consume no more than 25 grams (6 teaspoons) and 36 grams (9 teaspoons) of [added sugars](#) daily.²⁷ Too many added sugars may cause heart disease, type 2 diabetes, and weight gain.

Consider decaf green tea: The caffeine in green tea may cause anxiety and quicken your [heart rate](#).²⁶ Removing the caffeine from green tea may lower its antioxidant content.²⁸

Get creative: You can enjoy green tea alone, use it in oatmeal and smoothies, or for boiling rice and steaming vegetables.

When Is the Best Time To Drink Green Tea?

The caffeine in green tea is a stimulant, which increases alertness and keeps you awake. You may drink green tea in the morning for an [energy boost](#). Caffeine stays in your body for up to six hours, so avoid green tea too close to bedtime.²⁶

Types

One of the most common types of green tea is sencha, typically made in Japan. Sencha includes bancha and [matcha](#). Bancha has less caffeine and L-theanine, while matcha has the highest amounts.²⁹ Green tea also comes in several forms, including beverages, dietary supplements, and topicals.⁴³⁰

A Quick Review

Green tea is a staple in many cultures and may offer essential benefits. It may protect your bone, brain, and heart health. Even so, green tea can be risky for people with caffeine sensitivity or who take certain medications. Ask a healthcare provider or dietitian if you are unsure whether green tea is right for you.