

Nutritional benefits of Matcha

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1 What is matcha ?

Matcha is a japanese powdered green tea. It is considered to be one of the highest quality tea. It is particularly rich in antioxidant compounds as a result of the special cultivation method. According to the traditional method, for the majority of the growth period, the tea bushes are covered using bamboo mats to shade the leaves from excessive direct sunlight.

In the course of this process, plants are able to produce higher amounts of amino acids and bioactive compounds, including chlorophyll (subsubsection 2.1.6) and theanine (subsubsection 2.1.7), responsible for the unique, non-bitter taste and the characteristic, vibrant colour of matcha.

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.

2 Nutritional contents

The nutrients in matcha tea are 60–70% insoluble ingredients such as fat-soluble vitamins, insoluble dietary fibers, chlorophylls, and proteins [8].

2.1 Antioxidants

The role of antioxidants is to combat free radicals which are molecules in our body that damage our cells.

Matcha tea infusions have high antioxidant potential, which is also visible in its powdered form. It has been proven that powdered tea, in comparison to leaf tea, is characterized by a higher concentration of polyphenols (molecules that plants produce to defend themselves, also antioxidants) when using the same amount of leaves and powder.

2.1.1 Catechins

Matcha contains catechins, a type of phenolic compound with beneficial effects on human health. High polyphenolic content has a greater capacity for scavenging free radicals (molecules that damage cells) than vitamin C on its own [5]. Catechins also boost the detoxification activity of enzymes.

Once matcha is dissolved in water, it produces 3 times more catechins than the loose-leaf form of greentea.

Catechin content in green teas is much higher than in black teas, amounting to 5.46–7.44 mg/g, compared with 0–3.47 mg/g in black tea.

Catechins act synergistically with anticancer medications, and can be used to support therapy as well as in cancer prevention.

2.1.2 Caffeine

Caffeine is also an antioxidant.

Caffeine is an essential component of tea beverages and is responsible for their distinctive and desirable taste. In regular doses, caffeine may reduce persistent oxidative stress, bringing down the prevalence of free radical-mediated diseases and showed anti-inflammatory effects [5].

An analysis demonstrated that caffeine intake might promote weight, BMI and body fat reduction [9]. Regular dietary intake of caffeine may reduce the risk of cognitive decline in women, and its effect increases with age. Caffeine may indirectly inhibit ageing of the brain, and in this way maintain its normal function. The content of caffeine in green teas was found to fall within the range of 11.3–24.67 mg/g, while in matcha it amounted to between 18.9 and 44.4 mg/g. For the sake of comparison, most coffee beans will contain 10.0–12.0 mg caffeine/g of beans [5].

2.1.3 Rutin

Matcha green tea has an exceptionally high rutin content, compared to other teas available in the market [4]. Its synergistic interaction with ascorbic acid (A.K.A Vitamin C) may enhance the protective effects of both substances in the cardiovascular system, strengthening blood vessels.

It also has antidiabetic and anti-inflammatory properties, thus preventing diabetes-related pathologies. Its antioxidant and anti-inflammatory action offers potential for preventing conditions of free-radical or inflammatory origin, including neurodegenerative conditions.

Rutin found in matcha at 1968.8 mg/L is compared to that in buckwheat (la sarasine en français) at 62.30 mg/100 g, where buckwheat is being recognised as one of the richest sources of rutin in the human diet.

2.1.4 Quercetin

Quercetin is a phytochemical with antioxidant and neuroprotective activity. It was observed to normalize carbohydrate metabolism by inhibiting glucose absorption from the gastrointestinal tract, regulating insulin secretion and improving insulin sensitivity in tissues.

The content of quercetin of matcha was measured at 1.2 mg/mL, which is marginally higher than in traditional green tea (1.1 mg/mL).

2.1.5 Vitamin C

Vitamin C is a powerful antioxidant. Due to its properties, it reinforces the immune defence of the body. Infusions of matcha tea contain from 32.12 to 44.8 mg/L of vitamin C, depending on the temperature of water used to prepare the infusion and the type of tea.

Matcha was found to contain more than double the amount of vitamin C of other green teas. Its content was determined at 1.63–3.98 mg/g, depending on

the type of product and its origin.

It is an essential micronutrient in human nutrition which should be supplied every day in adequate amounts. FYI, the recommended daily intake of Vitamin C is 90 mg for men and 75 mg for women, up to 85 mg for pregnant women and 120 mg for breastfeeding women (National Institutes of Health).

Vitamin C has also been associated with protective effects against cancer.

2.1.6 Chlorophyll

Chlorophyll exhibits strong antioxidant and anti-inflammatory activity.

The level of chlorophyll in Tencha leaves was higher than in traditional green tea, amounting to 5.65 mg/g and 4.33 mg/g, respectively, so 130 % more in matcha.

2.1.7 Theanine (L-theanine)

Theanine is an amino-acid which matcha has more than other plants due to the way matcha is grown.

The combination of L-theanine and caffeine may enhance concentration, vigilance and efficiency to a higher extent than the use of either compound alone, additionally alleviating stress [5].

2.2 More health benefits

2.2.1 EGCG

Matcha contains EGCG (for the curious, its unpronounceable god forsaken complete name is *epigallocatechin gallate*), a substance naturally present in green tea. EGCG is a potent and effective neuroprotective agent in neurological disorders mediated by inflammation. The intake of EGCG prevents neuropathologies related to neurodegenerative diseases, including Alzheimer's disease.

2.2.2 Anticarcinogenic

EGCG may be related to inhibiting tumour angiogenesis (the process where new blood vessels form from existing ones, supplying nutrients and oxygen to a growing tumor, it can be related to breast cancer [6]), antioxidant effects and suppressing the inflammatory processes contributing to transformation, hyperproliferation and initiation of carcinogenesis [5].

Consuming large amounts of EGCG may contribute to reducing the incidence of colorectal cancer, partly due to inhibiting tumour growth factors. What is more, EGCG is capable of inhibiting growth and inducing apoptosis (which is the normal and planned death of the cells in your body) of cancer cells [5].

2.2.3 Anti-inflammatory

Inflammatory response is part and parcel of many diseases. It may lead to the production of excessive amounts of substances promoting the production of re-

active oxygen species, which can damage cell structures and lead to long-term disruption in the functioning of the body as a whole, as well as playing signalling functions promoting inflammation [5].

Reactive oxygen species are created during stressful situations : environmental pollution, improper diet, chronic psychological stress, very intense and prolonged physical exertion, etc. Consequences include illnesses such as diabetes, atherosclerosis, neoplastic disease, neurodegenerative diseases or the aging of the organism [4].

The main effect of anti-inflammatory and antioxidant substances is to inhibit signalling in the inflammatory process by scavenging the reactive oxygen species.

2.2.4 Antiviral

Green tea and its antiviral effect may support the prevention and regulate immune response in infectious diseases, including COVID19 [5].

2.2.5 Cognitive functions

Consumption of green tea is regarded as an effective dietary intervention to promote clarity of mind and cognitive function. These health benefits are attributed mainly to EGCG.

It has been found that higher consumption of vitamin E in daily diet can lead to a greater effect of matcha green tea powder intake on cognitive function [7].

2.2.6 Stress-reducing effects

High contents of theanine and arginine in matcha exhibited a high stress-reducing effects (significant decrease in anxiety, experiments done on 39 healthy students where they drank 3 grams of matcha daily for 15 days) [10].

Also, matcha consumption might lead to maintenance or improvement of attention [8].

Only 42% of matcha samples sold in Japan, and only one sample marketed abroad, were expected to have a stress-reducing effect because the amounts of theanine and Arg were low, and the amounts of caffeine and EGCG were high. [10]. Thus a quality check of matcha is necessary.

2.2.7 Arginine

Matcha also contains arginine, a *conditionally* essential amino-acid. *Conditionally* means that some people do not synthesize arginine in adequate amounts, such as newborn infants and people with diseased livers. They must obtain these conditionally essential amino acids from their diet [11].

2.2.8 Dopamine transmission

Caffeine coupled with theanine can also enhance cognitive function by increasing the dopaminergic (it's the adjective for "related to dopamine") transmissions in

the brain [7].

2.2.9 Vitamin K

Matcha contains vitamin K : 29 μg per gram of matcha (a classical serving of matcha is 2g) [1]. The daily recommended intake for vitamin K is 120 μg for men and 90 μg for women (National Institutes of Health).

Vitamin K helps for bone formation and mineral association, such as Calcium, to the bone structure [2].

Furthermore, vitamin K is essential to blood coagulation (which means that blood stacks at a location to become a compact mass) which is important in scar healing : it helps in stopping the hemorrhage [3].

A vitamin K deficiency can lead to nose bleeding, abundant blood period and osteoporosis (your bones becomes weak and brittle).

2.3 Temperature of water

It has been demonstrated that infusions made by steeping tea leaves have a lower polyphenol content than those made from the powdered form. One parameter which has a significant effect on the chemical composition and health promoting properties of a tea beverage is the temperature of the water used to make the infusion.

11 green teas have been examined, differing in terms of the manufacturing process and form, including bagged, loose leaf and powdered tea; matcha brewed at three temperatures : 60°C; 80°C and 100°C and over different durations : 3, 5, 10, 15 and 30 minutes.

In all green teas, antioxidant capacity increased together with the temperature of water used to prepare the infusion, and the optimal values were observed at the highest temperature with a 3-min brewing time. The powdered form had the highest parameters of all the green teas. Extending the brewing time of powdered matcha did not increase its antioxidant capacity [5].

3 Conclusion

Matcha is a fucking banger.

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