



The Health Benefits of Green Coffee Extract:

Coffee is a widely consumed beverage in the US. More than half of Americans drink coffee every day. Coffee was first discovered in Ethiopia in the 9th century. Cultivation of the coffee tree began in the 15th and 16th centuries in Egypt and Yemen. Coffee was then introduced to America in 1607 with the arrival of Captain John Smith, and then introduced into Latin America by the French in 1714. Since these ancient times, coffee has been consumed for its stimulating effects on the central nervous system. However, most recently scientists have regarded coffee as a health beverage.

Coffee is harvested from trees of the Rubiaceae family. There are 3 species of coffee trees: Arabica, Robusta and Liberica. Arabica accounts for 75% of the world's production and produces coffee beans with the highest quality of flavor. Robusta is generally used in lower grade coffees such as instant and commercial blends. Liberica is not commonly used. The fruit that grows on a coffee tree is called the cherry. Each cherry contains 2 seeds, or beans. When harvested, the raw coffee beans are green in color. Only after the roasting process do the beans become dark.

The chemical constituents of the raw green coffee beans contribute to its health benefits. Green coffee contains caffeine and polyphenols. The caffeine content found in coffee beans is 1% – 2%. Caffeine is commonly known for its stimulant and diuretic effects. Green coffee contains an abundance of antioxidants. The major polyphenols found in green coffee beans are chlorogenic acid and its isomers. Chlorogenic acids are a family of esters formed between quinic acid and phenolic compounds known as cinnamic acids. The most abundant chlorogenic acid in coffee is 5-*O*-caffeoylquinic acid, an ester formed between quinic acid and caffeic acid. Green coffee beans can contain as much as 10% chlorogenic acids, and are one of the richest sources of chlorogenic acids in the diet.

Green Coffee Extract has a number of health benefits related to weight management: reduction in fat adsorption, inhibition of fat accumulation, fat metabolism, prevention against Type II Diabetes Mellitus and antioxidant activity.

Weight Management

There is no doubt we are fast becoming a nation of obese people. The National Health and Nutrition Examination Survey estimates that 120 million adults in the U.S. age 20 and older are overweight or obese. Obesity is the second-leading cause of preventable deaths in the US, but is rapidly becoming more than a Western-world issue.

Green Coffee Extract promotes the loss of visceral fat. This is fat in the tissues lining the abdominal cavity and surrounding the internal organs. It is typically associated with the "apple" body shape. Visceral fat can lead to an increased risk of metabolic syndrome and Type-2 diabetes.

Chlorogenic acid and caffeine found in Green Coffee Extract promote fat loss by blocking gastric and pancreatic lipase. Lipases are enzymes that break down triglycerides so they can be stored in the body's fat cells.

In one study, mice were fed an unrestricted diet and either Green Coffee Extract, caffeine or chlorogenic acid. The mice were weighed every 2 days for 14 days and their epididymal and perirenal fats were removed and weighed at the end of the study. Green Coffee Extract was shown to suppress body weight gain better than chlorogenic acid or caffeine alone, suggesting a synergistic effect between chlorogenic acid isomers and caffeine. Green Coffee Extract also suppressed visceral fat accumulation.

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This same study also examined hepatic carnitine palmitoyltransferase (CPT) activity in mice. Fat metabolism in the liver occurs in hepatocytes by a process called β -oxidation. CPT is the rate limiting enzyme responsible for β -oxidation. Mice fed a diet containing Green Coffee Extract showed an increase in CPT in the liver. This illustrates that chlorogenic acid and its related compounds aid in fat metabolism in the liver.

Green Coffee Extract promotes the metabolism of fat. Brown adipocytes from rats were treated with Green Coffee Extract in vitro. After 18 hours, there was a significant decrease in the size of the oil vesicles.

Furthermore, mice fed olive oil were administered Green Coffee Extract. Both hepatic and serum triglyceride levels were measured and were significantly reduced by Green Coffee Extract, indicating that Green Coffee Extract may reduce fat adsorption and inhibit fat accumulation.

In a study done on 50 humans with a Body Mass Index (BMI) of 25 or greater, Green Coffee Extract was consumed over a period of 60 days. A mean reduction of 4.97 kg in body weight and a decrease of 1.9 kg/m² in BMI were observed. Additionally, muscle mass to fat mass ratio was significantly increased compared to the control group (4:1 vs. 1:6).

Diabetes and Sugar Regulation:

Type 2 Diabetes is the most common form of diabetes and usually appears in middle-age adults. The main risk factors for Type 2 Diabetes are obesity and physical inactivity. In a mild form, it can go undetected for many years. Untreated diabetes can lead to many serious medical problems, including cardiovascular disease. Type 2 Diabetes occurs when the body does not produce enough insulin, or the body's cells ignore the insulin.

Insulin is necessary for the body to utilize sugar. Sugar is the basic fuel for the cells in the body, and insulin transports sugar from the blood into the cells. When glucose builds up in the blood instead of going into cells, cells become starved for energy and the eyes, kidneys, nerves and heart can all be seriously damaged.

Chlorogenic acid has been found in vitro and in vivo to inhibit the hydrolysis of the glucose-6-phosphatase and alpha-glucosidase. Glucose-6-phosphatase is stored in the liver and removes phosphate group from glucose-6-phosphate produced during glycogenolysis and gluconeogenesis. Alpha-glucosidase is a rate-limiting enzyme in gluconeogenesis. This enzyme is found in the intestine and it aids in the conversion of glycogen to glucose. These chlorogenic acid mechanisms reduce the free glucose being sent into the bloodstream.

In one study, mice were fasted for 18 hours and then given Green Coffee Extract. One hour later, the mice were given glucose solutions and postprandial blood sugar levels were assessed. Green Coffee Extract effectively delayed elevated postprandial blood sugar in the mice.

Another study done on humans in Moscow at the Modern Medical Center showed those who received chlorogenic acid before a meal showed a 15 – 20 percent reduction in postprandial blood sugar than those who received a placebo.

Multiple cohort studies were done on coffee consumption and the risk of Type 2 Diabetes in Europe, the US and Japan. Over 17,000 Dutch men and women age 30 – 60 years showed coffee consumption was associated with a significantly lower risk of developing Type 2 Diabetes. In Japan, over 17,000 men and women 40 – 65 years of age

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showed a reduced risk for Type 2 Diabetes with the consumption of coffee. Two separate studies done in the US on 28,812 postmenopausal women and 88,259 women age 26 – 46 years showed that consumption of decaffeinated coffee lowered the risk of Type 2 Diabetes. This indicates that compounds in coffee other than caffeine may play a key role in Type 2 Diabetes.

Antioxidant Activity:

Chlorogenic acids found in Green Coffee Extract are powerful antioxidants. Oxidative stress can lead to cellular degeneration and a host of degenerative diseases. Chlorogenic acids neutralize free radicals and hydroxyl radicals. They are believed to be twice as effective as antioxidants from green tea and grape seed. A study done in Italy showed coffee had the highest Total Antioxidant Capacity of 34 beverages analyzed.

Other Health Benefits:

There are other potential health benefits associated with Green Coffee Extract. Studies continue to be done examining additional health benefits. Chlorogenic acids may reduce blood pressure and help to protect the body against liver cirrhosis, atherosclerosis and rectal disease.

Safety:

Green Coffee Extract is safe to consume. Most of the adverse effects of coffee consumption are related to caffeine. Caffeine can cause tachycardia (rapid heart rate), palpitations, insomnia, restlessness, nervousness, tremor, headache, abdominal pain, nausea, vomiting, diarrhea, and diuresis (increased urination). Caffeine can also interact with some medications and decrease the body's ability to absorb calcium. However, the caffeine content in most Green Coffee Extracts is low (<10%). Studies done on Green Coffee Extract in rats showed no sign of toxicity or mutagenicity. Human studies showed no changes in ECG, blood or urine profiles. Phenolic compounds from coffee may bind nonheme iron, inhibiting its intestinal absorption. Recommended levels are 60mg – 280mg chlorogenic acid per day. This would equate to consuming 1 -2 cups of coffee per day.

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