

# **Botanical Insights for Hypertension, Hypercholesterolemia and Cardiovascular Health**



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# Introduction

Cardiovascular disease is prevalent in the modern-day world. Cardiovascular disease is an issue that impacts patients and families alike. In the United States, there are 27.1 million non-institutionalized adults who are diagnosed with heart disease, or 11.8% of U.S adults.<sup>1</sup> One in three adults in the United States has high blood pressure, a factor that increases the risk for heart disease and stroke, the first and third leading causes of death in the United States. One in six American adults has high cholesterol. Approximately 25.8 million or 8.3% of the United States population has diabetes.<sup>2</sup>

These diseases are connected to lifestyle choices through diet, exercise and other health factors. The rampant spread of cardiovascular disease can be minimized through proper education, diet, exercise, good lifestyle choices and the use of botanical medicines.

This paper outlines the uses for:

- Hibiscus flowers (*Hibiscus sabdariffa*)
- Artichoke (*Cynara scolymus*)
- Dandelion Leaf (*Taraxacum officinale*)
- Phytonutrient: Resveratrol-trans, non-flavonoid polyphenol

## Why herbal medicines?

Herbal medicines have many benefits. Perhaps most importantly, they provide an alternative to many pharmaceutical drugs. In addition, many herbal medicines have fewer side effects than statin drugs, making them a good option for patients concerned about side effects from long term use of statin drugs and other cardiovascular medication. Herbs also provide effective options to enhance outcomes of other types of protocols or efficiencies in protocols. In fact, some botanical medicines can optimize the outcomes of a drug that is already being used to manage a problem, such as hypertension or hypercholesterolemia.

Botanical medicines offer other types of health benefits including improving circulation in cardiovascular disease, blood vessel integrity and strength and insulin issues. Unlike many drugs that target one specific condition, botanical medicines often target one primary aspect and give support to other aspects, systems or organs.

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<sup>1</sup> Summary Health Statistics for U.S. Adults: National Health Interview Survey

<sup>2</sup> CDC. Health, United States, 2008-2010. Hyattsville, MD: National Center for Health Statistics; 2008-2010


# Hibiscus flowers

## (*Hibiscus sabdariffa*)

Hibiscus is part of the Mallow or *Malvaceae* family. There are more than 300 varieties of these shrubs. The flower comes in a variety of different colors. The image on the slide below depicts a yellow, or *sabdariffa* genus, but this flower comes in shades of pink, white and red. They are prevalent in tropical climates.

### Hibiscus sabdariffa

- *Malvaceae* or Mallow family
- Over 300 varieties of the Hibiscus shrub
- Traditional uses:
  - high blood pressure, circulatory disorders
  - diuretic
  - as a laxative
  - to cool the body's temperature
  - cough, sore throat
  - nervous restlessness



### Traditional uses

Hibiscus is used to treat a variety of conditions such as high blood pressure and circulatory disorders. Traditionally, hibiscus has been used as a diuretic, which explains its use in treating hypertension. When working to control high blood pressure, it is important to try and move fluid and support diuresis. The diuretic benefits of hibiscus help this process.

Hibiscus is also used as a laxative to help cool the body. The constricted and dilated nature of cardiovascular disease, particularly hypertension, can often make relaxation difficult. Hibiscus helps to cool the body and address these issues.

Other uses for hibiscus include the treatment of sore throats, cough, nervousness and restlessness.

## Clinical indications

The clinical indications for hibiscus use are:

- Atherosclerosis
- Diabetes type II
- Dyslipidemia
- Hypertension
- Hypercholesterolemia
- Metabolic syndrome
- Anti-herpes simplex virus

These indications are well documented in literature and have been supported either by in vitro or placebo clinical trials.

## Active constituents

The active constituents in hibiscus come primarily from the plant acids. About 15-30% of the plant is made up of acids. Some acids, like the hibiscus acid, are specific to the plant and will not be found in other plants. But some acids, like the citric, malic, tartaric and butyric acid are more common and can be found in other plants. Anthocyanins and protocatechuic acids are important as antioxidants and in their effects in the vascular system and in LDL metabolism.

Dried calyces are the elements of the hibiscus flower that have high, rich color. This part of the flower is high in flavonoids including quercetin, gossypetin, hibiscetine, sabbaretine, pectin and mucilage. The calyces are used to make extracts and teas. In fact, dried calyces can often be seen in a cup of red zinger tea and are the source of the tea's sour taste.

Because flavonoids are anti-inflammatory and antioxidant, they are used to treat allergies and to stabilize inflammatory responses throughout the body. Quercetin is often used to treat allergic responses. Pectin and mucilage flavonoids are specific to hibiscus and add to its effects both as an antioxidant and for cardiovascular health.

There are many other active constituents of hibiscus, including alkaloids such as L-ascorbic acid and beta carotenes. These alkaloids have many antioxidant and anti-inflammatory values. Other alkaloids found in hibiscus are Beta-sitosterol, polysaccharides, arabins and arabinogalactans. Beta-sitosterol has an effect in the cardiovascular system. Polysaccharides, arabins and arabinogalactans help improve, stabilize and strengthen immune function.

Small amounts of sugars such as arabinose, xylose, mannose and rhamnose are also active constituents of hibiscus. These sugars act as diuretics because they are unable to be absorbed into the system through the kidneys and are released through urine. In addition, these sugars affect blood pressure and the amount of fluid and swelling in the body.

Hibiscus is a strong antioxidant that helps reduce oxidative stress, particularly in the vascular system, and acts as a cooling agent to diminish built-up heat. This plant also helps lower LDL cholesterol and blood pressure. Protocatechuic acids (PCA) in hibiscus helps inhibit oxidative LDL, which is often induced by either copper or a nitric oxidase donor, affecting the total and LDL cholesterol. Through inhibiting this oxidation of LDL, PCA affects the total LDL content, which will affect total cholesterol content.<sup>3</sup>

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<sup>3</sup> J Agric Food Chem (2002 Mar 27) 50(7):2130-6

## Antihypertensive

There have been several studies looking at the effects of hibiscus tea. Two studies compared the sour tea of hibiscus to placebo beverage tea for its therapeutic effectiveness in hypertension. The outcomes showed that the sour tea from hibiscus lowered blood pressure in pre and mildly hypertensive adults. It was determined that these teas may prove an effective component of the dietary changes recommended for people with these conditions. The pleasant taste of hibiscus tea makes it easy to integrate into any balanced diet.<sup>4</sup>

Two additional studies compared hibiscus to hypertensive drugs captopril and lisinopril. The studies compared whether the use of hibiscus was effective, tolerable and safe. Examining the serum electrolytes and ACE-inhibiting effects in hypertension, researchers discovered the hibiscus extract exerted an antihypertensive effect with a wide margin of tolerability and safety. Researchers found that hibiscus significantly reduced the plasma ACE activity and demonstrated a tendency to reduce serum sodium concentrations without modifying or compromising potassium, a common issue for many pharmaceuticals. Overall, people using hibiscus tea in these studies showed good tolerability, reported limited side effects and had no problems with safety. These results demonstrate that hibiscus tea is a good alternative to hypertensive drugs.<sup>5, 6</sup>

## Hypolipidemic effects

A 1-month study examined the use of 100 mg of hibiscus extract per day as a preventative treatment for metabolic syndrome. The outcomes of the study showed a significant reduction of glucose and total cholesterol. The hibiscus extract was also found to increase HDL-c levels, improve triglyceride/HDL ratios and improve total triglyceride levels. The outcomes suggested that the use of 100 mg of extracted powder could benefit individuals with dyslipidemia associated with metabolic syndrome. Much like the study using hibiscus tea to treat hypertension, safety and tolerability were also found to be strong in this study.<sup>7</sup>

## Dosing

Dosage amounts for hibiscus depend on the form in which the plant is being prescribed. The plant can be taken as a tea or an extract powder. Teas are a good option for patients who do not want to take any additional medications. There are two different forms of hibiscus tea. The first involves an infusion of the whole flower and provides an effective treatment for pre to mild hypertension. The dosage for this tea is 6 grams in 250 mL of water taken 2-3 times per day. The second form of hibiscus tea involves an infusion of the dry calyx. The dosage for this tea is 10 grams standardized to 9.6 mg of anthocyanins. Hibiscus can also be prescribed as an extract called Hibiscus sabdariffa extract powder (HSEP) which should be taken at 100 mg per day with food.

## Contraindications

Hibiscus is not traditionally recommended in the first trimester of pregnancy. Hibiscus can be used during second and third trimester as a tea; however, it is only recommended for use as part of a blend.

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<sup>4</sup> Phytomedicine (2010 Feb) 17(2):83-6|ISSN: 1618-095X

<sup>5</sup> Planta Med 2007;73:6-12

<sup>6</sup> Phytomedicine (2004 Jul) 11(5):375-82

<sup>7</sup> Gurrola-Diaz CM, Phytomedicine (2010 Jun) 17(7):500-51|ISSN: 1618-095X

## Toxicities

There are very few reports of toxicity associated with hibiscus. Generally, literature reviews reveal no evidence of toxicity of hibiscus sabdariffa when given in the recommended doses.

# Artichoke (*Cynara scolymus*)

## Traditional uses

Artichoke (*Cynara scolymus*) is traditionally thought of as a plant that promotes liver health and helps in detoxification. Besides promoting liver health, artichoke impacts the body in other positive ways. Studies indicate that artichoke extract helps maintain normal bile production and secretion. It has also been found to aid in fat digestion and utilization. Dietary fat is turned into stored fat in the body and therefore directly equates to how the body processes triglycerides and cholesterol.

Artichoke supports healthy cholesterol metabolism. By supporting good metabolism of cholesterol, cholesterol buildup and fat issues can be minimized which can lead to better cardiovascular health. This plant is also very effective in treating inflammatory and irritable bowel syndrome, as well as dyspepsia.

Lastly, artichoke improves serum antioxidant levels and helps circulate antioxidants in the vascular system. Because the vascular walls are prone to inflammatory insult, artichoke is a good option to help improve or minimize oxidation in the vascular walls.

The parts of the artichoke most commonly used are the leaves. Many people eat the artichoke flowers (the globe). The seeds of this plant are also used. A key phenolic compound, cynarin, is often standardized and viewed as a major antioxidant-driving constituent of this plant. Artichokes provide a large amount of inulin, which is a polysaccharide that promotes growth of beneficial flora in the intestinal tract; this may be the reason why this plant is so effective in treating both dyspepsia and irritable and inflammatory bowel issues.

Artichoke is very high in iron, potassium, calcium and magnesium. Potassium is a mineral that is often necessary for good vascular health. It is high in B vitamins, other types of flavonoids, fiber and inulin, which makes for a very supportive intestinal microbiota environment. There are large amounts of essential fatty acids found in the artichoke, particularly linoleic acid.

## Randomized, double-blind placebo controlled trials

A 12-week study consisting of 75 patients used 1,280 mg of artichoke leaf extract and demonstrated its effectiveness in decreasing cholesterol. The study found a 4.2% decrease in total cholesterol for the artichoke leaf extract group, compared to a 1.9% decrease in the placebo group. The results indicated that consumption resulted in a modest but favorable reduction in total cholesterol.<sup>8</sup>

A 6-week study consisting of 143 patients with hyperlipoproteinemia used 1,800 mg of artichoke leaf extract per day. The study found these doses helped prevent atherosclerosis, cardiovascular disease and helped lower total cholesterol and LDL. No adverse effects were seen. The chart in the image below demonstrates that in the artichoke group, total cholesterol was lowered over 18% and LDL was lowered over 22% versus the placebo group where total cholesterol was lowered only 8.6% and LDL was lowered 7.9%.<sup>9</sup>

<sup>8</sup> Bundy; Phytomedicine. 2008 Sep; 15(9):668-75. PubMed PMID: 18424099

<sup>9</sup> Marakis G, Arzneimittelforschung. 2000 Mar; 50(3): 260-5

## Artichoke Leaf Extract

- **Randomized Double-Blind Placebo Controlled Trial**

- 6 weeks, 143 adults hyperlipoproteinemia
- 1800 mg artichoke extract/day
- No adverse effects
- Recommends artichoke extract for treatment of hyperlipoproteinemia
- Prevention for atherosclerosis and CHD

	AE Group	Placebo	
Total Cholesterol	18.5%	8.6%	Decrease ↓
LDL	22.9%	7.9%	Decrease ↓

Marakis G, Arzneimittelforschung. 2000 Mar;50(3):260-5

When considering both of these studies, it is important to remember that the dosages varied by about 600 mg. Dose dependence may be something to consider when dealing with patients in more diseased states.

### **Artichoke efficacy in functional dyspepsia**

A 6-week placebo-controlled, double-blind multi-center study looked at artichoke and functional dyspepsia. Functional dyspepsia can inhibit good cleaving and digestion of fats and nutrients from the body. Researchers used a questionnaire as part of the assessment. Out of 247 patients, 244 completed the assessment. Half of those who took the assessment took 640 mg of artichoke leaf extract 3 times a day. In the end, the artichoke leaf extract preparation was shown to be significantly better overall in alleviating symptoms and improving disease-specific quality of life in people who had functional dyspepsia.<sup>10</sup>

Taking artichoke can help lower cholesterol levels, but attention should also be given to the digestive system. Addressing digestive issues helps aid the process of how the body processes and stores fat, how that fat gets used as energy, and how the fat gets used as a precursor to other substances in the body. In short, artichoke does more than just bind up fats; it changes the way the body affects those fats.

### **Dosage**

The dose range for artichoke varies from 600–1,500 mg per day of leaf extract standardized to the cynarin flavonoid. For hypercholesterolemia, the artichoke dosage should be 1,800–1,900 mg per day. As a tincture, dosage suggestions are 3-5 mL as a 1:5 extract, 3 times per day. Integrating artichoke into the diet is also an easy and effective way to reap the benefits of this plant.

Artichoke is generally considered safe and well tolerated, although some people who have allergies to Asteraceae may have allergies to artichoke. In addition, some who have bile duct obstructions will have an aversion to this plant because it causes the bile duct to contract and secrete. In this case, artichoke is not recommended.

<sup>10</sup> Aliment Pharmacol Ther. 2003 Dec; 18(11-12):1099-105



## Resveratrol/ Non-flavonoid polyphenol

Recently, resveratrol has received scientific attention for its potential support in blood vessel function and overall heart health. Foods that contain resveratrol include: the skins of red grapes, red wine, juice, peanuts, berries in the *Vaccinium* species (blueberries, bilberries, and cranberries) and *Polygonum* (also known as Japanese knotweed). The amount of resveratrol in foods varies. In grape skins, the amount of resveratrol may vary depending on who cultivated the fruit, where it was grown, and exposure to fungus and fungal infections.

Resveratrol is also produced artificially through a biotechnical synthesis using metabolic engineered microorganisms to produce a phytonutrient form which is primarily derived from *Polygonum*.

Resveratrol increases the activity and number of mitochondria in the cells, which helps both with energy production in the cells and with the movement of energy at a cellular level. Resveratrol helps to activate antioxidant transcription factor Nrf2. In addition, resveratrol modulates gene expression of superoxide dismutase and glutathione peroxidase. These two enzymes are used in the detoxification process, both at a cellular level and in the liver. Resveratrol increases lipolysis, helps with fatty acid oxidation, liver function and gluconeogenesis, the recalling of certain types of glucose and the storage of glucose. It also decreases glycolysis and cytokine-induced CRP expression, and acts as an anti-inflammatory, minimizing certain types of breakdown.<sup>11</sup>

Though it has not been proven in a clinical study, resveratrol has been found to inhibit platelet aggregation in vitro. Further benefits of resveratrol include the promotion of vasodilation by the enhanced production of nitric oxide. Resveratrol also inhibits anti-inflammatory enzymes and improves flow-mediated dilation. These benefits are dependent on dosage amounts and the form in which it is prescribed. Foods will not provide dosage amounts significant enough to produce cardioprotective effects in flow-mediated dilation through the heart. To get these benefits, it is recommended to prescribe resveratrol in its concentrated form.<sup>12</sup>

### Resveratrol and curcumin

Resveratrol and curcumin work together to help minimize cytokine expression, helping to minimize the process that can lead to chronic inflammation. Curcumin is an effective anti-inflammatory, both in the hepatic and cardiovascular systems. As antioxidants, resveratrol and curcumin work synergistically to minimize the cytokine expression and buildup of oxidative debris in the cardiovascular system and liver, impacting how other elements affect the liver, both in fat metabolism and in inflammation.<sup>13</sup>

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<sup>11</sup> Miller ACAM Natural Medicine Workshop Las Vegas, Nevada, Nov 3-4, 2010

<sup>12</sup> Linus Pauling Institute Micronutrient Information Center, Linus Pauling Institute, 2005-2012

<sup>13</sup> Miller, ACAM Natural Medicine Workshop Las Vegas, Nevada, Nov 3-4, 2010

### Resveratrol dosages

Typically, resveratrol is used in a 10–50 mg per day dose. No significant side effects are mentioned in literature; however, resveratrol has been found to affect the P450 system and the CYP3A4 substrate systems in the liver. Keeping this in mind, if a person is on medications it may be best not to implement this phytonutrient, or use with caution. For those already using resveratrol and hoping to add a medication, combination is less of a concern because the patient will have already acclimated to resveratrol. Medications that slow blood clotting, such as anticoagulants/antiplatelet medications, could be affected by resveratrol, so it is important to monitor use with these medications. In general, it is best to use food sources in preventative and maintenance protocols, and extracted forms in therapeutic protocols.

## Dandelion leaf (*Taraxacum officinale*)

Dandelion leaf (*Taraxacum officinale*) is a traditional diuretic. The diuretic benefits of this plant come from the leaf, not the root (used mostly in relation to hepatic function). As a botanical diuretic, dandelion leaf helps lower blood pressure by reducing the amount of fluid in the bloodstream. Dandelion is also very mineral-dense and contains high amounts of potassium, one of the minerals commonly lost through prescription diuretics or diuresis. The leaves of dandelion are nutritionally dense and contain vitamins A, B and C. The plant also contains calcium, fiber, iron, magnesium, manganese, phosphorus, potassium, selenium, silicon, sodium and zinc.

Dosage suggestions are 3-5 mL as a 1:5 extract, 3 times per day. Dandelion leaf can be used as an infusion, or consumed as a leafy green or juiced with other fruits or vegetables. All dosage forms are generally safe. Dandelion contains no known toxicities, side effects or known drug interactions. It is thought to be safe during pregnancy and lactation.

## Conclusion

There is a proven role for hibiscus, artichoke, resveratrol and dandelion in cardiovascular health. Hibiscus can be used as a tea or in extract form to help treat hyperlipidemia, hypertension and metabolic syndrome. Artichoke has proven benefits for treating metabolic syndrome and hyperlipidemia. Resveratrol is an excellent antioxidant for the cardiovascular system, and in combination with curcumin can provide a synergistic, antioxidant and hepatic benefit. Both hibiscus and dandelion are effective diuretics. Each of these plants can be used to help prevent cardiovascular disease and promote a healthy heart and healthy blood vessels.

## Contributor's biography

Dr. Bove received her doctorate of naturopathic medicine and midwifery certification from Bastyr College of Nature Health Sciences in Seattle, Washington. She received her diploma of cytotherapy and herbal medicine at the School of Cytotherapy in Great Britain.

Dr. Bove practices naturopathic family medicine at the Brattleboro Naturopathic Clinic, in Brattleboro, Vermont and serves as a member of Gaia Herbs Professional Solutions Scientific Advisory Board. She is the author of *The Encyclopedia of Natural Healing for Children and Infants*, and coauthor of *Herbs for Women's Health*. She has been published in many magazines, journals, and other collaborative books on botanical and natural medicine. She also lectures and teaches internationally.