

# **Hibiscus Sabdariffa:**

## **A Research Review of Its Uses and Safety**



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# A Research Review on the Use of Hibiscus Sabdariffa

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## **Background and Uses**

Hibiscus sabdariffa, or sour tea, is a genus of the Malvaceae family. In Iran, it is typically known as sour tea. In English-speaking countries it is called Red Sorrel. Originally from Angola, it is now cultivated throughout tropical and subtropical regions, especially from Sudan, Egypt, Thailand, Mexico and China.

Approximately 15%-30% of the plant is made up of plant acids, including citric, malic, tartaric acids and allo-hydroxycitric acid lactone—i.e. hibiscus acid which is specific to this plant. Other chemical constituents are many, including alkaloids, L-ascorbic acid, anthocyanin, Beta-carotene, Beta-sitosterol, citric acid, polysaccharides arabins and arabinogalactans, quercetin, gossypetin and small amounts of galactose, arabinose, glucose, xylose, mannose and rhamnose.

The calyces of *H. sabdariffa* are prolific in many modern commercial blends of cold and hot drinks due to its pleasing taste, as well as having decorative, culinary and medicinal uses. In Egypt and the Sudan, it is used as a beverage that helps to lower the body temperature, to treat cardiac conditions, and as a diuretic.<sup>1</sup> In African folk medicine it has been used for its spasmolytic, antibacterial, cholagogic, diuretic and anthelmintic properties. Other uses in North Africa include cough and sore throat, while the leaf pulp is made into a topical application for external wounds and abscesses.<sup>2</sup> In Europe, the dried calyces (the cup-like structures that are formed by the sepals) are used mostly as a tea. Hibiscus is commonly used in combination with lemon balm and St John's wort for restlessness and poor sleep onset.<sup>3</sup> Historically, folk medicine has used *H. sabdariffa* for the treatment of high blood pressure, liver diseases and fevers. In large amounts, hibiscus tea acts as a mild laxative. In Iran, it is a traditional treatment for high blood pressure which is the focus of several studies, as is cholesterol reduction. Hibiscus has been used historically for high blood pressure and contains several important ingredients including alkaloids, anthocyanins and quercetin. It is thought that the antioxidant and diuretic effects of hibiscus are its most important mechanisms in lowering blood pressure.

## **Summary of Research on Cardiovascular Applications**

Scientific interest in Hibiscus has grown in the last several years with a small burst of published research studies, especially in the area of dyslipidemia and hypertension. Over twenty years ago, water extracts of hibiscus flowers were reported to have a relaxation effect on the uterus and to lower the blood pressure.<sup>4</sup> Studies in both animal<sup>5, 6, 7, 8</sup> and human models have demonstrated that extracts or infusions affect atherosclerosis mechanisms, blood sugar, lipids and blood pressure<sup>9, 10</sup>

1. In 2007, a clinical trial showed that Hibiscus reduced cholesterol by 8.3% to 14.4% after just one month.<sup>11</sup> A total of 42 subjects were randomized to 3 groups for the study, conducted in Taiwan. The hibiscus extract capsules contained 500 mg of dried herb by

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macerating 150 g of hibiscus flowers in 6 L of hot water for 2 hours and then drying and filtering the extract. Group 1 received 1 capsule of extract 3 times daily (1,500 mg/day), group 2 received 2 capsules 3 times daily (3,000 mg/day), and group 3 received 3 capsules 3 times daily (4,500 mg/day)

Overall, subjects in group 2 responded best to the hibiscus extract treatment. Groups 1 and 2, but not group 3, experienced a significant reduction in serum cholesterol levels at week 4, compared with baseline levels. In addition, group 2 experienced a significant reduction in serum cholesterol levels at week 2, compared with baseline levels. At week 2, there was a 42.9% responder rate in groups 1 and 3 and a 64.3% responder rate in group 2. By week 4, group 2 had a cholesterol reduction response from 71.4% of the subjects. In group 1, 50.0% were responders, and 42.9% subjects in group 3 were responders at week 4. It appeared that group 2, taking 1,000 mg three times daily, was the optimum dose in achieving cholesterol reduction effects. While this study is small with a small number of subjects in each of the study groups, as well as a short duration of 4 weeks, there was indeed a clear effect with significant reductions in serum cholesterol seen as early as week 2, in the 1,000 mg tid group. Oddly enough, the responders in group 3, receiving the highest dose (4,500 mg/day), had the smallest response to the hibiscus extract with an average of 8.3% reduction at week 4. Group 1 received a 14.4% reduction at week 4.

2. In 2009, 60 Type 2 diabetics, mostly women, were given either Hibiscus tea from Saudi Arabia or black tea, 1 cup twice per day.<sup>12</sup> Seven individuals withdrew from the study and after one month, mean HDL cholesterol increased significantly (48.2 mg/dL to 56.1 mg/dL) whereas apolipoprotein A1 and lipoprotein (a) were not significant. There was also a significant decrease in the mean of total cholesterol (236.2 to 218.6), LDL cholesterol (137.5 to 128.5), triglycerides (246.1 to 209.2) and Apo-B100 (80.0 to 77.3) in the Hibiscus group. Only HDLc showed a significant change in the black tea group (46.2 to 52.01). Something as simple as Hibiscus tea in a diabetic, is a welcomed intervention. Achieving a 7.6% decrease in total cholesterol, an 8.0% decrease in LDLc, a 14.9% decrease in triglycerides, a 3.4% decrease in Apo-B100, a 4.2% increase in Apo-A1 and a 16.7% increase in HDLc is no small accomplishment with merely two cups of tea per day.
3. Hibiscus extract was also studied in 222 patients, some with and some without metabolic syndrome (MS).<sup>13</sup> A total daily dose of 100 mg Hibiscus sabdariffa extract powder (HSEP) was given for one month to men and women, 150 without MS and 72 with MS. They were randomly assigned to a preventive diet, HSEP treatment or diet combined with HSEP treatment. The MS patients receiving HSEP had significantly reduced glucose, total cholesterol and LDL-c and increased HDL-c. A triglyceride lowering effect was seen in all groups but was only significant in the control group that was treated with diet. The triglyceride/HDL-c ratio was also significantly reduced with HSEP in the control and MS groups, indicating an improvement in insulin resistance. It has been hypothesized that the anthocyanins regulate adipocyte function, which has definite and important implications for both preventing and treating metabolic syndrome. Due to both its

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hypolipidemic and hypotensive effects, Hibiscus extract would be an excellent option for individuals with metabolic syndrome.

4. A double-blind, placebo control, randomized trial in 69 subjects with elevated LDL and no history of coronary heart disease did not appear to show a blood lipid lowering effect from Hibiscus extract.<sup>14</sup> The treatment group received 1,000mg/day Hibiscus extract for 90 days in addition to dietary and physical activity. Body weight, serum LDL cholesterol and triglyceride levels decreased in both the extract and placebo groups, with no significant differences between the two. It is likely that the positive effects were due to dietary and exercise activity. One wonders why the results of this study were negative and the three previous studies above, showed positive results. The doses and product used in all four studies were different. One a tea, another used dried powdered flowers, another used a standardized extract powder of the sepals of the flowers, and this one, an ethyl alcohol/water extract, dried and then powder of the leaves. It is reasonable to consider that these different preparations would yield different results. With more consistent product selection and dosages used in larger randomized trials, we would hope that this would clarify the best intervention to use.
5. Hypertension is another area indicated for the use of Hibiscus. The blood pressure lowering effects of sour tea (ST) Hibiscus sabdariffa was compared with black tea (BT) in type II diabetics with mild high blood pressure.<sup>15</sup>

Patients were randomly assigned to drink one cup of Hibiscus or black tea two times per day for one month. The average systolic blood pressure (SBP) in the Hibiscus group decreased from  $134.4 \pm 11.8$  mm Hg at the start of the study to  $112.7 \pm 5.7$  mm Hg after 1 month. The average SBP changed from  $118.6 \pm 14.9$  to  $127.3 \pm 8.7$  mm Hg in the black tea group during the same time period. There were no statistically significant effects on the mean diastolic blood pressure in either group. This drop in systolic blood pressure is clinically relevant, decreasing systolic blood pressure in pre-hypertensive ranges, to normal systolic blood pressure. We do not know if systolic blood pressure would be lowered by one cup of Hibiscus tea in those with stage I or stage II hypertension.

6. A randomized, controlled, double-blind clinical comparison study was done of Hibiscus sabdariffa extract with lisinopril on patients with stage I or II hypertension.<sup>16</sup> A dried powdered Hibiscus extract was delivered in 250 mg of water containing a total of 250 mg anthocyanins from Hibiscus extract for 4 weeks and the lisinopril group received 10 mg/day. Results showed that the Hibiscus extract decreased blood pressure from 146/98 mm/Hg to 130/86 mm/Hg. Blood pressure reductions were lower than with lisinopril, but the Hibiscus extract did not modify plasma potassium levels and did not have the mineralocorticoid effects. Based on the study data, the authors concluded that the Hibiscus extract did have a significant antihypertensive action, and through at least two mechanisms of action: diuretic effects likely as an aldosterone antagonist and ACE inhibitory effects. It was also reassuring to note in the study that the diuretic activity did not alter plasma potassium levels and did not have mineralocorticoid effects.

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7. A Cochrane review of Hibiscus effects on blood pressure published in 2010 resulted in five articles.<sup>17</sup> The reviewers included randomized controlled trials (RCTs) of 3-12 weeks in duration that compared Hibiscus to either placebo or no intervention at all. All five of these studies found significant reductions in systolic blood pressure. While they could not draw reliable conclusions about the benefit of Hibiscus for controlling or lowering blood pressure in hypertensive patients, in the articles that met their inclusion criteria, they did state that beneficial effects were found in the treatment of hypertension with Hibiscus, but that well-designed, placebo-controlled RCTs were needed.

The safety profile of Hibiscus is excellent with no proven adverse reactions. Hibiscus also has a Generally Recognized as Safe (GRAS) status.

## **Clinical Dosing for Practitioners**

Again, it is difficult to clarify dosing recommendations when different products are used in different studies. The following doses were used in each of the positive studies.

For dyslipidemia: consider 1,000 mg dried herb tid; 1 cup of tea bid or 100 mg of extract bid.

For hypertension: consider 1 cup of tea bid; dried powdered Hibiscus extract (250 mg anthocyanins) per day

## **About the Author**

Dr. Tori Hudson, Naturopathic Physician, graduated from the National College of Naturopathic Medicine (NCNM) in 1984 and has served the college in several capacities, including: Medical Director, Associate Academic Dean, and Academic Dean. She is currently a clinical professor at NCNM, Southwest College of Naturopathic Medicine and Bastyr University, has been in practice for 26+ years, is the medical director of her clinic, “A Woman’s Time” in Portland, Oregon, and director of product research and education for Vitanica.

Dr. Hudson was awarded the 1990 President’s award from the American Association of Naturopathic Physicians for her research in women’s health, the 1999 prestigious Naturopathic Physician of the Year award, the 2003 NCNM Alumni Pioneer Award and the 2009 Natural Products Association Pioneer Award.

She is a nationally recognized author (book: Women’s Encyclopedia of Natural Medicine second edition, McGraw Hill 2008), speaker, educator, researcher, and clinician. Dr. Hudson serves on several editorial boards, advisory panels and as a consultant to the natural products industry.

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