



## Fibre, Food & Beauty for poverty reduction

# *Nutritional properties of Bissap: health claims and evidence*

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The Bissap plant (*Hibiscus sabdariffa*) has been used in traditional medicine for many centuries, its vivid flowers and calyces often steeped to make a striking red tea.

In fact there are a huge number of claims made for Bissap's therapeutic benefits, from Ayurvedic menstrual remedies<sup>1</sup> to hangover cures and treatments for cancer.

As well as its popular appeal as a beverage, hibiscus is clearly regarded as a health drink in many cultures. In the countries of origin, the flowers have been, or still are used as an antiseptic, aphrodisiac, astringent, cholagogue, demulcent, digestive, diuretic, emollient, laxative, cooler, sedative, and tonic! In Chinese folk medicine they are used to treat liver disorders and high blood pressure. In East Africa, the infused hibiscus drink called "Sudan tea", is taken to relieve coughs.<sup>2</sup>

However many of these anecdotal benefits have not been subjected to clinical study. Fortunately, extracts of Hibiscus (Bissap) have also been the subject of hundreds of scientific studies, some of these attracting attention from the British media. This summary covers those health claims which are supported in some way by scientific studies or trials.

### **Lowering Blood Pressure**

High blood pressure (hypertension) afflicts one in three people in Britain. It also increases risks of heart disease by three fold and causes 60 per cent of strokes. In Northern Nigeria Hibiscus drink is traditionally used as a treatment for this condition.<sup>3</sup>

Scientific studies indicate that Bissap can indeed lower blood pressure<sup>4 5</sup> and inhibit the angiotension converting enzymes (ACE) that play a part in raising blood pressure<sup>6 7</sup>. A study

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<sup>1</sup> [www.alandiashram.org/school/school\\_html/articles/menstrual.html](http://www.alandiashram.org/school/school_html/articles/menstrual.html)

<sup>2</sup> *Fruits of warm climates* Julia F. Morton, Miami, FL 1987. Roselle. p. 281–286. Distributor: Creative Resource Systems, Inc. Box 890, Winterville, N.C. 28590. Many health sites state that Hibiscus tea is used to soothe irritated tissues and the mucous membranes that line the respiratory tract.

<sup>3</sup> *Traditional use of sorrel drink (Hibiscus sabdariffa) for hypertension in northern Nigeria* Olorunfemi Idu, M., A.C. Omonhinmin and D.J. 1999 Published in: *Ethnobotany* 11, 1/2, 105–110

from Tufts University, Boston generated considerable media coverage when it suggested that daily consumption of hibiscus tea (in an amount readily incorporated into the diet), lowers BP in pre- and mildly hypertensive adults and may prove an effective component of the dietary changes recommended for people with these conditions <sup>8</sup>

Another biomedical study showed that giving 500mls of Hibiscus tea to patients with mild to moderate hypertension was as effective as giving them the anti-hypertensive drug Captopril. <sup>9</sup>

## Cholesterol lowering and antioxidant properties

Oxidation in the human body produces chemicals called 'free radicals'. These chemicals have been linked to diseases such as heart and liver disease, and cancer. Coronary heart disease is the biggest killer in the UK and death rates from coronary heart disease in the U.K. are among the highest in the world. Liver disease is rising dramatically in Britain and over the next ten to 20 years will overtake cardiovascular diseases as the single biggest cause of death, ministers said last year.

Antioxidants are chemical compounds that can bind to 'free radicals' preventing them from damaging healthy cells.

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<sup>4</sup> *Mechanisms of the blood pressure lowering effects of the calyx extract of Hibiscus sabdariffa in rats.* Adegunloye B. J., Omoniyi, J. O., Owolabi, O. A., Ajagbona, O. P., Sofola, O. A., Coker, H. A. (1996). *Afr. J. Med. Sci.* 25: 235-238.

<sup>5</sup> *Chronic administration of aqueous extract of Hibiscus sabdariffa attenuates hypertension and reverses cardiac hypertrophy in 2K-1C hypertensive rats.* Odigie, I. P., Ettarh, R.R., and Adigun, S. (2003). *J. Ethnopharmacol.* 86 : 181-185.

<sup>6</sup> *Activités inhibitrices enzymatiques in vitro et angioprotectrice in vivo d'extraits de karkadé (Hibiscus Sabdariffa L.)* Jonadet M, et al. *J. Pharm Belg.* 1990; 45 (2): 120-124. (ref. 5058)

<sup>7</sup> *Mechanism of relaxant effect mediated by an aqueous extract of Hibiscus sabdariffa petals in isolated rat aorta.* Owolabi OA, et al *International Journal of Pharmacognosy* 1995; 33 (3):210-214. (ref. 371)

<sup>8</sup> *Hibiscus sabdariffa L. tea (tisane) lowers blood pressure in prehypertensive and mildly hypertensive adults.* McKay DL, Chen CY, Saltzman E, Blumberg JB. Antioxidants Research Laboratory; Energy Metabolism Laboratory, Jean Mayer USDA Human Nutrition Research Center on Aging at Tufts University, Boston, MA Abstract: *Philippine Journal of Nutrition* Feb;140(2):298-303. Epub 2009 Dec 16

<sup>9</sup> Biomedical research by the Instituto Mexicano del Seguro Social compared the antihypertensive effectiveness and tolerability of a standardized extract from Hibiscus sabdariffa with captopril, an ACE inhibitor medication used in the treatment of high blood pressure. The results showed that H. sabdariffa was able to decrease the systolic blood pressure (BP) from 139.05 to 123.73mm Hg and the diastolic BP from 90.81 to 79.52mm Hg. The hibiscus had a similar hypotensive effect, tolerability and antihypertensive effectiveness as the captopril. *Effectiveness and tolerability of a standardized extract from Hibiscus sabdariffa in patients with mild to moderate hypertension: a controlled and randomized clinical trial.* Herrera-Arellano A, Flores-Romero S, Chávez-Soto MA, Tortoriello J. Centro de Investigación Biomédica del Sur, Instituto Mexicano del Seguro Social, Argentina 1 Xochitepec, 62790 Morelos, Mexico. Abstract: *Phytomedicine: international journal of phytotherapy and phytopharmacology* 2004 Jul;11(5):375-82.

Studies from around the world indicate that Bissap exhibits strong antioxidant activity<sup>10 11 12 13 14 15</sup> and that this is linked to the pigments (anthocyanins), which give the plant its vivid red colour.<sup>16 17</sup> To assess its antioxidant properties one study<sup>18</sup> compared its activity with that of BHA (Butylated Hydroxyanisole), an anti-oxidant widely used in fat-containing foods (for its antioxidant properties), and also, beta-carotene. The results showed that the Hibiscus extract had stronger antioxidant activity than both BHA and beta-carotene.

Scientists from Chung Shan University in Taiwan<sup>19</sup> have stated that the antioxidant properties of the compounds found in the flower may reduce cholesterol levels and the risk of heart disease. Their research showed that anthocyanins, flavonoids and polyphenolic compounds contained in the flower can prevent the oxidation of the 'bad' LDL cholesterol associated with heart disease. Commenting in the *Journal of the Science of Food and Agriculture* Researcher Chau-Jong Wang commented that this study shows that hibiscus flower extract is as effective as red wine and tea

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<sup>10</sup> *Antioxidant effects of aqueous extracts from dried calyx of Hibiscus sabdariffa Linn. (Roselle) in vitro using rat low-density lipoprotein (LDL).* Hirunpanich V, Utaipat A, Morales NP, Bunyaphatsara N, Sato H, Herunsalee A, Suthisisang C. Department of Pharmacology, Faculty of Pharmacy, Mahidol University, Rajadhevi, Bangkok, Thailand. Abstract: *Biological & pharmaceutical bulletin* 2005 Mar;28(3):481-4. Publisher; Pharmaceutical Society of Japan

<sup>11</sup> *Antioxidant and antihyperlipidemic activity of Hibiscus sabdariffa Linn. leaves and calyces extracts in rats.* Ochani PC, D'Mello P. Department of Pharmacognosy and Phytochemistry, Prin K M Kundnani College of Pharmacy, Mumbai India Abstract: *Indian journal of experimental biology*. 2009 Apr;47(4):276-82. Publisher: National Institute of Science Communication and Information Resources, CSIR

<sup>12</sup> *Antioxidative activity of three herbal water extracts.* Duh PD, et al *Food Chemistry* 1997; 60 (4): 639-645. (Ref. 5130)

<sup>13</sup> *Antioxidative properties of roselles (Hibiscus sabdariffa L.) in linoleic acid model system.* Tee P-L, et al *Nutrition & Food Science* 2002; 32 (1):17-20. (ref. 5059)

<sup>14</sup> *Anthocyanin and antioxidant capacity in Roselle (Hibiscus Sabdariffa L.) extract.* Tsai, P. J., McIntoshb, J., Pearceb, P., Camdenb, B. and Jordanc, B.R. (2002). *Food Research International* 35 : 351-356.

<sup>15</sup> *Protective influence of Hibiscus sabdariffa, an edible medicinal plant, on tissue lipid peroxidation and antioxidant status in hyperammonemic rats* M. Mohamed Essa, P. Subramanian, T. Manivasagam, K.B. Dakshayani, R.Sivaperumal, S. Subash Department of Biochemistry, Faculty of Sciences, Annamalai University, India *African Journal of Traditional, Complementary and Alternative Medicines* Vol. 3, No. 3, 2006, pp. 10-21

<sup>16</sup> *Anthocyanin and antioxidant capacity in Roselle (Hibiscus Sabdariffa L.) extract.* Tsai, P. J., McIntoshb, J., Pearceb, P., Camdenb, B. and Jordanc, B.R. (2002). *Food Research International* 35 : 351-356.

<sup>17</sup> *Antioxidative properties of roselles (Hibiscus sabdariffa L.) in linoleic acid model system.* Tee P-L, et al *Nutrition & Food Science* 2002; 32 (1):17-20. (ref. 5059)

<sup>18</sup> *ibid*

<sup>19</sup> *Inhibitory effects of Hibiscus sabdariffa L extract on low-density lipoprotein oxidation and anti-hyperlipidemia in fructose-fed and cholesterol-fed rats* Chang-Che Chen, Fen-Pi Chou, Yung-Chyan Ho, Wea-Lung Lin, Chin-Pin Wang, Erl-Shyh Kao, An-Chung Huang, Chau-Jong Wang. Institute of Biochemistry & Biotechnology, Chung Shan Medical University Taiwan *Journal of the Science of Food and Agriculture* Vol 84 Issue15 p 1989–1996 Dec 2004

compounds in reducing cholesterol (and lipid build-up) in the blood serum of lab animals. Other studies have also highlighted hibiscus' inhibiting effect on LDL cholesterol.<sup>20 21 22 23 24 25 26</sup>

## Nutritional properties

Julia Morton, Research Professor of Biology and Director of the Morton Collectanea, University of Miami (a research and information center devoted to economic botany) states that nutritionists analysed the calyces of roselle (another name for Bissap) sold in Guatemalan markets and found them to be high in calcium, niacin, riboflavin and iron.<sup>27</sup> The analysis can be found in the book *Fruits of Warm Climates*<sup>28</sup>

## Weight Loss

A number of articles and websites recommend drinking hibiscus tea to assist in weight loss.<sup>29</sup>

Studies show that Hibiscus tea contains an enzyme inhibitor which blocks production of amylase - an enzyme that breaks down complex sugars and starches.<sup>30 31 32</sup> So it may be

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<sup>20</sup> *Hypocholesterolemic and antioxidant effects of aqueous extracts from the dried calyx of Hibiscus sabdariffa L. in hypercholesterolemic rats.* Hirunpanich V, Utaipat A, Morales NP, et al. *J Ethnopharmacology* 2006; 103(2):252-260.

<sup>21</sup> *Hibiscus anthocyanins-rich extract inhibited LDL oxidation and oxLDL-mediated macrophages apoptosis.* Chang YC, Huang KX, Huang AC, Ho YC, Wang CJ. *Food Chem Toxicol* . 2006;44(7):1015-1023.

<sup>22</sup> *The consumption of Hibiscus sabdariffa dried calyx ethanolic extract reduced lipid profile in rats.* Carvajal-Zarrabal O, Waliszewski SM, Barradas-Dermitz DM, et al. *Plant Foods Hum Nutr* . 2005;60(4):153-159.

<sup>23</sup> *Effect of Hibiscus sabdariffa on obesity in MSG mice.* Alarcon-Aguilar FJ, Zamilpa A, Perez-Garcia MD, et al. *J Ethnopharmacol* . 2007;114(1):66-71.

<sup>24</sup> *Hibiscus sabdariffa extract inhibits the development of atherosclerosis in cholesterol-fed rabbits.* Chen CC, Hsu JD, Wang SF, et al. *J Agric Food Chem* . 2003;51(18):5472-5477.

<sup>25</sup> *Hypolipidemic and antioxidant effects of ethanolic extract from dried calyx of Hibiscus sabdariffa in alloxan-induced diabetic rats.* Farombi EO, Ige OO. *Fundam Clin Pharmacol* . 2007;21(6):601-609.

<sup>26</sup> *Hibiscus anthocyanins-rich extract inhibited LDL oxidation and oxLDL-mediated macrophages apoptosis.* Chang YC, Huang KX, Huang AC, Ho YC, Wang CJ. Institute of Biochemistry and Biotechnology, Chung Shan Medical University, Taiwan. *Food Chem Toxicol*. 2006 Jul;44(7):1015-23. Epub 2006 Feb 13.

<sup>27</sup> See <http://www.hort.purdue.edu/newcrop/morton/roselle.html> for Food Value Per 100 g of Edible Portion

<sup>28</sup> *Fruits of warm climates.* Julia F. Morton, Miami, FL 1987. Roselle. p. 281–286. Distributor: Creative Resource Systems, Inc. Box 890, Winterville, N.C. 28590

<sup>29</sup> [www.positivehealth.com/article-view.php?articleid=330](http://www.positivehealth.com/article-view.php?articleid=330) is one of many examples

<sup>30</sup> *Alpha-amylase inhibitors from roselle (Hibiscus sabdariffa Linn.) tea.* Hansawasdi C, Kawabata J, Kasai T. *Biosci Biotechnol Biochem*. 2000;64:1041–1043. Published: Japan Society for Bioscience, Biotechnology, and Agrochemistry

possible that drinking a cup of hibiscus tea after meals (as part of a controlled weight loss programme) could reduce the absorption of dietary carbohydrates and assist in weight loss. A study by the University of Veracruz, Mexico <sup>33</sup> using Hibiscus extract concluded that components of the extract used in the experiment could be considered as possible anti-obesity agents.

## Relieving the painful symptoms of cystitis

Around one in six women get cystitis each year. (Children and men can also get cystitis though it is less common). To reduce the painful symptoms of Cystitis and UTIs, many experts and GPs now advise sufferers to incorporate cranberry and other foodstuffs with a high-antioxidant level into their diet. A study<sup>34</sup> conducted by the Cystitis and Overactive Bladder Foundation (COB)<sup>35</sup> found a hibiscus drink already on the market <sup>36</sup> to be more effective than cranberry juice in relieving the condition.

The COB trial was conducted amongst its members and compared the effects of the hibiscus infused juice on the symptoms of cystitis to the effects of cranberry juice. 59% per cent of participants in the study felt regular consumption of the hibiscus based health drink was more effective than cranberry. More than three quarters (77%) said that they would use it again with 86% recommending it to a friend.

**Fibre, Food & Beauty for Poverty Reduction** is a joint project of PAN Germany, PAN UK, OBEPAB from Benin and Enda Pronat from Senegal. It aims to raise awareness about the many different food crops grown by organic cotton farmers in Africa and help them to find better marketing options for these, in local or export markets.

The project is funded by Europe Aid Co-operation Office and TRAIID.

For more info on the Fibre Food & Beauty project, visit:

<http://www.pan-uk.org/food/fibre-food-beauty>

<sup>31</sup> *Hibiscus acid as an inhibitor of starch digestion in the Caco-2 cell model system.* Hansawadi C, Kawabata J, Kasai T *Biosci Biotechnol Biochem.* 2001;65:2087–2089. Published:ibid

<sup>32</sup> *Inhibition by Natural Dietary Substances of Gastrointestinal Absorption of Starch and Sucrose in Rats and Pigs: 1. Acute Studies* Harry G. Preuss, Bobby Echard, Debasis Bagchi and Sidney Stohs *International Journal Med Sci.* 2007; 4(4): 196–202. Published online 2007 [www.ncbi.nlm.nih.gov/pmc/articles/PMC1950274/](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1950274/)

<sup>33</sup> *Effect of Hibiscus sabdariffa L. dried calyx ethanol extract on fat absorption-excretion, and body weight implication in rats.* Carvajal-Zarrabal O, Hayward-Jones PM, Orta-Flores Z, Nolasco-Hipólito C, Barradas-Dermitz DM, Aguilar-Uscanga MG, Pedroza-Hernández MF. *Biochemical and Nutrition Chemistry Area, University of Veracruz, Mexico Journal Biomed Biotechnol.* 2009;2009:394592. Epub 2009 Sep 10.

<sup>34</sup> [www.talkmenopause.com/webdocs/features/be\\_kind\\_to\\_your\\_kidneys\\_with\\_simply\\_hibi.php](http://www.talkmenopause.com/webdocs/features/be_kind_to_your_kidneys_with_simply_hibi.php)

<sup>35</sup> The Cystitis and Overactive Bladder Foundation (COB) is a leading UK charity supporting research into all forms of cystitis and overactive bladder. The foundation provides resources for patients and health professionals. The study was conducted in association with Ibis Organics

<sup>36</sup> Composed of 85% of hibiscus infused water and 15% fruit extract.