

# Hibiscus sabdariffa extract: a nutraceutical with exciting potential for preventing UTI and dyslipidemia

## Market trends show people seeking natural health solutions

Advances in medicine have provided life-saving treatments for genetic and infectious diseases, giving us the prospect of a longer life. But as we lead more sedentary lives, the risk of lifestyle-related diseases increases with age. Healthcare costs can be crippling.

Fortunately, digital media coverage of health research has made us more aware of the importance of natural foods for optimum health. For health reasons, we are eating more plant-based foods.

Healthcare is changing too. In the UK, Plant-Based Health Professionals<sup>1</sup> educate health workers, policymakers and the public on the benefits of whole food plant-based nutrition to prevent and treat chronic disease. Reaching a global audience, Dr Campbell at the Center for Nutrition Studies<sup>2</sup> and Dr Greger at NutritionFacts.org<sup>3</sup> help us make dietary choices for better health.

Businesses are responding to the growing consumer trend for self-care. Health apps make it easier for us to take our health into our own hands, enabling us to track what we eat, when we exercise and how we sleep.

Public mistrust in the pharmaceutical industry, shown by the Edelman Trust Barometer<sup>4</sup>, presents an ideal opportunity for nutraceuticals to provide an alternative to pharmaceuticals.

Mordor Intelligence<sup>5</sup> says the nutraceuticals market is predicted to record revenue of US\$671.30 billion by 2024. Consumers are buying more nutraceutical products as part of a healthier lifestyle to prevent disease. Mordor reports US and European markets are tapping into natural products with health claims.

Nutraceuticals also provide an opportunity for economic growth in developing countries that have traditional knowledge of the health effects of their native plant species. Functional beverages are the fastest growing nutraceuticals category, ahead of dietary supplements and functional food, which is the largest.

In their report “Nutraceuticals: the Future of Intelligent Food”<sup>6</sup>, KPMG predicts that companies combining the manufacturing technology and consumer reach of the food industry with the research capabilities of the

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<sup>1</sup> <https://www.plantbasedhealthprofessionals.com/>

<sup>2</sup> <https://nutritionstudies.org/>

<sup>3</sup> <https://nutritionfacts.org/>

<sup>4</sup> [https://www.edelman.com/sites/g/files/aatuss191/files/2019-02/2019\\_Edelman\\_Trust\\_Barometer\\_Global\\_Report\\_2.pdf](https://www.edelman.com/sites/g/files/aatuss191/files/2019-02/2019_Edelman_Trust_Barometer_Global_Report_2.pdf)

<sup>5</sup> <https://www.mordorintelligence.com/industry-reports/global-nutraceuticals-market-industry>

<sup>6</sup> <https://home.kpmg/content/dam/kpmg/pdf/2015/05/neutraceuticals-the-future-of-intelligent-food.pdf>

pharmaceutical industry will take the lead. Nutraceutical superfoods could have a key role in public health by linking diet to the prevention of health problems, such as obesity, diabetes and cardiovascular disease.

## Botanical extracts as part of the nutraceutical solution

In light of this growing demand for nutraceuticals, the *British Journal for Pharmacology* identifies the need for a clear definition and regulatory framework. The article<sup>7</sup> also highlights the need for clinical studies to back up health claims.

Some nutraceuticals have already been well studied, with findings to show their potential in the prevention and treatment of human disease. *Hibiscus sabdariffa* extract is one such nutraceutical.

The *Hibiscus sabdariffa* plant is widely grown in tropical areas including the Caribbean, Australia, Brazil, Central America, India, Africa, the US and the Philippines. The plant's common name is roselle.

In Asia and Africa, hibiscus seeds are roasted or ground into powder for use in meals, while the leaves and shoots are eaten raw or cooked. In Egypt, the calyces are used to make tea and in Sudan, Nigeria and Mexico, they are boiled with sugar to produce a hot drink.<sup>8</sup>

The hibiscus flowers, calyces (sepals) and leaves are used in local cultural medicine too. For example, in Asia hibiscus extract is used to lower blood pressure or improve liver function. Around the world, hibiscus extracts are consumed in the form of dietary supplements and nutraceuticals.

## Can hibiscus extract help prevent urinary tract infections?

### What are urinary tract infections?

A urinary tract infection (UTI) is a painful infection in your kidneys, ureters, bladder or urethra.<sup>9</sup> Women and girls are more at risk of a UTI than men and boys because the female urethra is shorter and closer to the anus. Studies<sup>10</sup> report one in three women experience a clinically significant UTI by the time they reach 24. Around 50 percent of women will experience at least one UTI in their lifetime.

### What causes UTIs?

The most common UTI infections occur in the bladder (cystitis) and the urethra (urethritis). Up to 90 percent of bladder infections involve *Escherichia Coli* (*E. coli*) bacteria commonly found in the gastrointestinal tract. UTIs occur when bacteria enter the urinary tract. This can result from wiping habits after using the toilet, or from sexual activity.

Hormone changes during menopause and urinary tract changes during pregnancy increase the risk of a UTI. Children with urinary tract abnormalities and adults with blockages from kidney stones or an enlarged prostate are also at risk. Likewise, people who need to use a catheter.

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<sup>7</sup> <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5867125/>

<sup>8</sup> <https://www.sciencedirect.com/science/article/pii/S030881461400692X>

<sup>9</sup> <https://www.medicalnewstoday.com/articles/189953.php>

<sup>10</sup> <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5522788/>

## Why are UTIs penetrating our body's natural defences?

The urinary system usually fends off bacterial invaders, but a compromised immune system can weaken defences, allowing bacteria to multiply. Sexual activity can push the invaders further up the urinary tract to the bladder.

Frequent urination may help protect against a UTI by stopping *E. coli* bacteria sticking to cell walls. But once the bacteria reach and colonise the bladder, they are no longer removed by urination. If the infection reaches the kidneys, it can cause serious complications such as premature delivery in pregnant women, kidney damage or sepsis. Over-reliance on antibiotics for treating UTIs

Even though research suggests 25 to 42 percent<sup>11</sup> of uncomplicated bladder infections clear up on their own, antibiotics are the common treatment for UTIs.

Antibiotics are an effective treatment, but their overuse is causing bacteria such as *E. coli* to develop resistance, making antibiotics less effective in treating bacterial infections. This is even more problematic because UTIs often reoccur in the same people.

## Antibiotic overuse causes antimicrobial resistance

According to the UK's National Institute for Health and Care Excellence (NICE), research<sup>12</sup> shows that up to half of samples of UTIs in children are resistant to common antibiotics. NICE recommends<sup>13</sup> antibiotics should not be prescribed for infants and children with their first infection. The World Health Organisation's action plan<sup>14</sup> aims to tackle the overuse of antibiotics in human and animal health.

UTI researchers recommend that antibiotics are not routinely prescribed to women in the first few days of an infection. It isn't just about antimicrobial resistance either.

## Side effects from antibiotic treatment

Antibiotics can cause nausea and diarrhoea and can also affect liver function and gut microbiota. Antibiotics remove harmful bacteria, but they also kill good bacteria needed for healthy bodily functions. The most common side effect of antibiotics, however, is a vaginal *Candida* infection.

To improve public and environmental health, we need to educate high-risk groups on how to prevent recurring UTIs and to improve the diagnosis of UTIs needing antibiotics<sup>15</sup>. We also need to develop non-pharmacological alternatives for minor infections. This is where hibiscus extract comes into its own.

## Hibiscus sabdariffa extract: a nutraceutical alternative for treating UTIs

*Hibiscus sabdariffa* has long been used in traditional cultural medicine for bladder and kidney health, particularly in Asia and Africa where the plant is a native species. With acidic and antibacterial properties, tea made from hibiscus calyces is thought to protect against UTIs. Hibiscus tea is popular in Western cultures too as people seek food and drinks with health benefits.

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<sup>11</sup> <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5522788/>

<sup>12</sup> <https://www.nice.org.uk/news/article/antibiotic-resistance-high-among-children-with-urinary-tract-infections>

<sup>13</sup> <https://www.nice.org.uk/guidance/cg54>

<sup>14</sup> <https://www.who.int/antimicrobial-resistance/global-action-plan/optimize-use/en/>

<sup>15</sup> <http://www.cidrap.umn.edu/news-perspective/2019/04/uk-study-emergency-room-uti-diagnosis-often-lacks-evidence>

While studies on cranberry juice and UTIs have produced mixed results with some studies finding no preventative effect, the results for hibiscus extracts have been more positive.

### Scientific research supports health claims

A University College London (UCL) School of Pharmacy review<sup>16</sup> published in the journal *Food Chemistry* examined phytochemical and pharmacological research on *Hibiscus sabdariffa*. Several *in vitro* and *in vivo* studies have shown a potent antioxidant effect due to its “strong scavenging effect on reactive oxygen and free radicals”.

Plant-based nutrition expert Dr Michael Greger also acknowledges the antioxidant punch of hibiscus tea.<sup>17</sup> When a team of international researchers compared over 3,000 foods and hundreds of beverages, hibiscus tea topped the antioxidant-rich drinks table.

The flower and calyx contain polyphenols, including flavonoids and anthocyanins, which act as antioxidants. The UCL review also refers to studies that found hibiscus extracts have an antibacterial effect and inhibit the growth of bacteria that cause UTIs.

In another study<sup>18</sup>, researchers from the Department of Biomedicine & Biotechnology at the University of Alcalá evaluated the potential of a non-pharma oral supplement approved for the prevention of UTIs.

The oral device contains xyloglucan (a natural hemicellulose from tamarind tree seeds), *Hibiscus sabdariffa* and propolis. Xyloglucan is a ‘mucosal protector’, a class of products that form a bioprotective film.

Previous studies have shown the protective properties of the ingredients in preventing *E. coli* adhesivity in the intestine. Researchers in this *in vitro* study, published in *Future Microbiology*, expected to see similar effects in preventing *E. coli* adhesion to cells in the urinary tract.

The scientists tested the barrier properties of xyloglucan, *Hibiscus sabdariffa* and propolis against urinary-tract strains of *E. coli* bacteria in intestinal and uroepithelial cell models.

They found the protective effects of xyloglucan are mainly evident in the intestinal tract cells, whereas hibiscus and propolis form a protective barrier against *E. coli* and prevent adhesion to urinary tract cells.

Their results support cultural knowledge and previous experience of the role of hibiscus and propolis in preventing UTIs.

Researchers acknowledge more research is needed but suggest nonpharmacological products are a safe and useful alternative to antibiotics to prevent recurring UTIs. Finding an alternative is crucial to tackling antimicrobial resistance. This is especially so when fluoroquinolones used to treat UTIs are ineffective in more than 50 percent of cases in some countries.

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<sup>16</sup> <https://www.sciencedirect.com/science/article/pii/S030881461400692X>

<sup>17</sup> <https://nutritionfacts.org/2013/09/03/hibiscus-tea-the-best-beverage/>

<sup>18</sup> Benito Fraile, Javier Alcover et al. (2017). Xyloglucan, hibiscus and propolis for the prevention of urinary tract infections: results of *in vitro* studies. *Future Microbiology*, 12(8), 721–731.

## Can Hibiscus sabdariffa help people with dyslipidemia?

### What is dyslipidemia?

Dyslipidemia is a term that describes unhealthy levels of lipids, or fats, in the blood.<sup>19</sup> These lipids include low-density lipoproteins (known as LDL cholesterol), high-density lipoproteins (HDL cholesterol) and triglycerides.

LDL cholesterol is known as 'bad' cholesterol because it can cause plaque to form on blood vessel walls. HDL cholesterol is 'good' cholesterol because it helps remove LDL. Excess triglycerides from food calories or liver production are stored in fat cells.

While lipids have a vital role in providing energy to cells, when LDL cholesterol or triglyceride levels are too high or HDL cholesterol is too low, our risk of developing atherosclerosis increases. With the build-up of plaque our arteries narrow, and we are more likely to suffer a heart attack or stroke.

### What causes dyslipidemia?

Primary dyslipidemia is genetic and inherited. Secondary dyslipidemia is caused by medical conditions that affect blood lipid levels, such as obesity, diabetes, hypothyroidism, polycystic ovary syndrome, alcoholism, excess dietary saturated fats, chronic kidney or liver conditions, IBS and metabolic syndrome. Lifestyle factors such as lack of exercise and smoking also increase the risk, as well as menopause and old age.

### What is the extent of the high cholesterol health problem?

In 2015, the National Institute for Health and Care Excellence (NICE) reported<sup>20</sup> 6 in 10 adults in England were estimated to have cholesterol levels above 5 mmol/litre, which is the higher end of the normal range.

According to the World Health Organisation data<sup>21</sup>, one third of coronary heart disease is caused by high cholesterol. Raised cholesterol is a major cause of disease in both the developed and developing world, estimated to cause 2.6 million deaths worldwide and 29.7 million disability-adjusted life years.

In 2008, over 50 percent of adults in high-income countries had raised total cholesterol, which was more than double the number in low-income countries.

Clearly, our sedentary lifestyles and diets of highly processed foods are not as nature intended and we are seeing serious health impacts. By contrast, diets high in fruits and vegetables have been associated with a reduced risk of cancer and cardiovascular disease.

According to the WHO, "a 10% reduction in serum cholesterol in men aged 40 has been reported to result in a 50% reduction in heart disease within 5 years; the same serum cholesterol reduction for men aged 70 years can result in an average 20% reduction in heart disease occurrence in the next 5 years."

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<sup>19</sup> <https://www.medicalnewstoday.com/articles/321844.php>

<sup>20</sup> <https://www.nice.org.uk/guidance/ta394/documents/hypercholesterolaemia-primary-dyslipidaemia-mixed-evolocumab-final-scope2>

<sup>21</sup> [https://www.who.int/gho/ncd/risk\\_factors/cholesterol\\_text/en/](https://www.who.int/gho/ncd/risk_factors/cholesterol_text/en/)

## What are the typical treatments for dyslipidemia?

Doctors will treat any underlying medical conditions, encourage dietary and lifestyle changes or prescribe statin drugs if cholesterol levels are very high. But statins can cause side effects such as liver enzyme elevation, gastrointestinal issues, myopathy and renal dysfunction.

## Can hibiscus extracts help adults with dyslipidemia?

Hibiscus tea, or sour tea, is a highly popular beverage in Taiwan, especially for its perceived health benefits. *Hibiscus sabdariffa* is rich in polyphenols, anthocyanins and flavonoids that may make it suitable to help prevent cardiovascular disorders.

Researchers at Chun Shan Medical University in Taiwan have been working on scientific studies to support health claims. A study<sup>22</sup> published in the journal *Nutrition Research* suggests *Hibiscus sabdariffa* extract may be effective in treating patients with high cholesterol levels.

In previous studies, the researchers found that *Hibiscus sabdariffa* extract decreases serum cholesterol in rats fed cholesterol. In this clinical study, they wanted to test for any cholesterol-reducing effect on human subjects.

The 42 volunteers ranged from 18 to 75 years old with a cholesterol level of 175 to 327 mg/dL. Subjects were randomly assigned to three groups to test the effect of taking one, two or three capsules of hibiscus extract over a four-week period.

Serum cholesterol levels were measured at the outset and at two and four weeks. Taking *Hibiscus sabdariffa* extract for four weeks led to a significant decrease in the serum cholesterol level in participants from groups one and two.

In group two, the serum cholesterol level for 71 percent of participants was significantly lowered, with an average reduction of 12 percent. Researchers concluded that two capsules of *Hibiscus sabdariffa* extract taken with food for one month can significantly lower serum cholesterol level.

## Controlling dyslipidemia in obese adolescents

Another study<sup>23</sup> evaluated the effects of *Hibiscus sabdariffa* calyces on controlling dyslipidemia in obese adolescents. In this triple-blind placebo-controlled clinical trial, 90 obese adolescents aged 12 to 18 years with documented dyslipidemia were randomly assigned to two groups.

One group consumed two grams of fine powdered calyces of *Hibiscus sabdariffa* each day for one month. The control group consumed a placebo powder. Both groups received the same dietary and physical activity recommendations.

Overall, 72 participants completed the trial. Serum total cholesterol, low-density lipoprotein cholesterol and serum triglyceride showed a significant decrease in the hibiscus calyces group. LDL cholesterol was down by

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[https://www.researchgate.net/publication/247204754\\_Hibiscus\\_Sabdariffa\\_extract\\_reduces\\_serum\\_cholesterol\\_in\\_men\\_and\\_women](https://www.researchgate.net/publication/247204754_Hibiscus_Sabdariffa_extract_reduces_serum_cholesterol_in_men_and_women)

<sup>23</sup> <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3769081/>

seven percent and serum triglyceride down by nine percent. However, HDL cholesterol level was not changed significantly; researchers suggested a longer study period could provide more data on the effect on HDL.

Atherosclerosis carries long-term risks of cardiovascular disease. Although clear signs may not be evident until adulthood, early atherosclerotic changes have been seen in young people.

Childhood obesity is now a global health problem. Researchers recommend atherosclerosis prevention with guidance on healthy diet and exercise should start in childhood or adolescence. *Hibiscus sabdariffa* extract is a natural product which may be more suited to children and adolescents than statins in controlling blood cholesterol.

## Hibiscus extract in dietary supplements, functional foods and beverages

A scientific literature review<sup>24</sup> published in *Food Chemistry* lists many uses of *Hibiscus sabdariffa* extract in both dietary supplements and in functional foods, such as herbal drinks, hot and cold beverages, fermented drinks, wine, jam, jellied confectionaries, ice cream, chocolates, puddings and cakes. It is also used for its natural red colour.

Various studies<sup>25</sup> have found that *Hibiscus sabdariffa* extracts are safe for use in foods and beverages.

## Finding a trusted source of Hibiscus sabdariffa extract

With the growing popularity of natural food and beverages and the associated growth in suppliers, how do you find a trusted supplier of *Hibiscus sabdariffa*?

Naturalea<sup>26</sup> is a Swiss company with a clear mission: to develop high-quality natural extracts and products based on scientific research. Together with our international network of universities and collaborators, we develop ideas and create products for the nutraceutical, veterinary and cosmetics industries.

Our pure Hibiscus extract is made from fresh flowers of a premium cultivar of *Hibiscus sabdariffa* using a proprietary process that retains all the healthful compounds.

Our unique freeze-drying process concentrates key anti-oxidative anthocyanins and bioflavonoids in a deep red hibiscus extract powder. Our extract is also rich in micronutrients and is water soluble making it ideal for tea products.

Naturalea *Hibiscus sabdariffa* extract is vegan, gluten-free and GMO-free. Our company meets the international quality management standard ISO9001.

Get in touch to find out how we can help your business.

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<sup>24</sup> <https://www.sciencedirect.com/science/article/pii/S030881461400692X>

<sup>25</sup> <https://www.sciencedirect.com/science/article/pii/S030881461400692X>

<sup>26</sup> <https://www.naturalea.ch/>