



## The incredible health benefits of saffron: A Review

\* Izharul Hasan, \*\*Abdul Haseeb Ansari, \*\*A.M.K Sherwani, \*\*\*Mohd Zulkifl

\*Dept of Preventive and Social Medicine, National Institute of Unani Medicine Bangalore, Karnataka, India.

\*\*Lecturer, Dept of Preventive and Social Medicine, NIUM Bangalore, Karnataka, India.

\*\*\*HOD and Reader, Dept of Preventive and Social Medicine, NIUM Bangalore, Karnataka, India.

Received on: 12-04-2011; Revised on: 18-05-2011; Accepted on: 21-06-2011

### ABSTRACT

Saffron is a reddish-golden colored spice derived from the styles and stigmas of the flower of the saffron crocus (*Crocus sativus*). In ancient cultures, saffron was used to relieve stomachaches and kidney stones and also as an agent in improving the circulation of blood. Saffron's healing effects were also recognized in the US long ago and some grandmothers still mix a few sprigs of saffron in hot milk for their grandchildren to drink. Today, saffron is used for a wide variety of health conditions and many of its benefits have been validated by scientific studies. Saffron contains a number of carotenoids, which are believed to be largely responsible for a number of saffron's health benefits, including inhibiting skin tumors, improving arthritis and improving eye and vision health. The active constituents in saffron are also known to produce positive effects on people with neurodegenerative disorders. Medical studies have shown that saffron helps in enhancing oxygen diffusivity in plasma and other liquids while improving pulmonary oxygenation. It also helps to lower the levels of bad cholesterol and triglycerides. Saffron also contains the compound "crocin", which scientists believe to be the primary compound responsible for recent study results, which found saffron promotes learning, memory retention, and recall capacity.

**Key words:** Saffron, *Crocus sativus*, Crocin, Carotenoids

### INTRODUCTION

#### History of Saffron:

The word *saffron* derives from the Arab word *zafaran*, meaning yellow, and it was mentioned as far back as 1500 B.C. in many classical writings. One of the first historic references to the use of saffron comes from Ancient Egypt, where it was used by Cleopatra and other Pharaohs as an aromatic and seductive essence, and to make ablutions in temples and sacred places. Saffron is harvested from the fall-flowering plant *Crocus sativus*, a member of the Iris family. It is native to Asia Minor, where it has been cultivated for thousands of years to be used in medicines, perfumes, dyes, and as a wonderful flavoring for foods and beverages. Arabs used saffron in medicine for its anesthetic properties. It was the Arabs who introduced the cultivation of saffron in Spain in the X century. Evidence of different kinds assures that saffron was an irreplaceable ingredient in the hispanic-arabic cooking of that age.

During the Middle Age, saffron became well known in Great Britain. The legend says that, in the period of Edward III, a pilgrim brought a bulb of saffron hidden in a hole in his stick from Middle East to the town of Walden. There the bulb was grown and reproduced giving prosperity to the town. During the Renaissance, Venice stood out as the most important commercial center for saffron. In that period saffron was worth its weight in gold, and even today it is still the most expensive spice in the world.

**Common Names:** Alicante Saffron, Autumn Crocus, Crocus, Gatinais Saffron, Hay Saffron Karcom, Stima Croci, Zaffer

*French:* safran

*German:* safron

*Italian:* zafferano

*Spanish:* azafran

*Indian:* kesa, kesram, khesa, zafran

*Botanical name:* *Crocus sativus*

#### Spice Description:

Saffron is the three stigmas of the saffron crocus. They are delicate and thread-like, each measuring 2.5 - 4 cm (1 - 1.5 in). Its color is a bright orange-red, and in high quality saffron this is uniform. Saffron bearing white streaks or light patches is inferior and when light specks appear in its powdered form it suggests adulteration.

#### \*Corresponding author.

Dr Izharul Hasan

National Institute of Unani Medicine

Kottigepalya, Bangalore India

**Bouquet:** Strongly perfumed, with an aroma of honey

**Flavor:** A pungent bitter-honey taste.

**Useful Parts:** The flower's triple stigma and the adjacent part of the style yield the spice.

#### Saffron Forms:

Available in threads (whole stigmas) and ground, your best bet is to go with saffron threads. Not only will they retain their flavor longer, but you will also be assured you have purchased pure saffron.

Powdered saffron is not as strong, tends to lose flavor, and is also easily adulterated with fillers and imitations. Since so little is needed, you will find ground saffron sold in packets of about 1/16 of a teaspoon, and threads equaling about 1/4 gram or 1/2 of a teaspoon. Yet, these seemingly small amounts will often flavor more than one dish. Threads should be crushed before using. For ground saffron, lightly toast and grind threads yourself. Steep them in the cooking liquid before using. The longer you steep the saffron threads, the stronger the flavor and color.

**Cultivation of saffron:** The cultivation of saffron needs an extreme climate; hot and dry weather in summer and cold in winter.

The land must be dry, calcareous, aired, flat and without trees. Attributes that the Meseta of Castilla-La Mancha has, which has made it one of the most important production areas in the world. The soil must be equilibrated in organic material in order to avoid risks of erosion, and have some depth that allows the water to drain so that the bulb is not damaged. The sowing takes place in the months of June and July. The bulbs are placed in ridges of about 20 cm. depth. The distance between the bulbs should be of 10 cm. The sowing of bulbs is a very hard job because it is done by hand, and forces you to walk in a bent position for hundreds of yards. A mule follows the shower with a roman plough to cover the ridges. The harvesting takes place between the ends of October-beginning of November. The rose of saffron blooms at dawn and should stay the least possible time in the plant because it withers quickly and the stigmas lose color and aroma. This is why they are gathered between dawn and 10 a.m. The stigmas of saffron have a high level of moisture, so it is necessary to dry them for its good preservation. This is the process of roasting, in which the stigmas get its definitive aspect: bright red, rigid and without wrinkles. After the process of roasting, the stigmas of saffron would have 1/5 of their original size. This means that for one kg of raw stigmas we will obtain 200 g of saffron ready for consumption.

#### Preparation and Storage:

Because of its expense, intense flavor, and strong dyeing properties, very little saffron is required for culinary purposes and the key is to distribute it evenly throughout the dish being prepared. It can be crushed to a fine powder in a

mortar and pestle. It is easier however, to steep the saffron in hot water—a pinch to a cup will create the desired flavor and color. Good saffron should expand on contact with the water and a cup should be sufficient for 0.5 kg (1 lb) of rice. Powdered saffron is added directly to the required ingredients of a dish, though we recommend against buying saffron powdered, as it is so frequently adulterated. Storage should be in a cool dry place, out of the light.

#### **Use of Saffron:**

Saffron has been used as a seasoning, fragrance, dye, and medicine for more than 3,000 years. The world's most expensive spice by weight saffron consists of stigmas plucked from the saffron crocus (*Crocus sativus*). The resulting dried "threads" are distinguished by their bitter taste, hay-like fragrance, and slight metallic notes. Saffron is native to Southwest Asia, but was first cultivated in Greece. Iran is the world's largest producer of saffron, accounting for over half the total harvest.

In both antiquity and modern times, most saffron was and is used in the preparation of food and drink: cultures spread across Africa, Asia, Europe, and the Americas value the red threads for use in such items as baked foods, curries, and liquor. Medicinally, saffron was used in ancient times to treat a wide range of ailments, including stomach upsets, bubonic plague, and smallpox; clinical trials have shown saffron's potential as an anticancer and anti-aging agent. Saffron has been used to color textiles and other items, many of which carry a religious or hierarchical significance.

From ancient times, the saffron *Crocus sativus* L. has been widely used as a drug to promote health and fight disease, especially in the Middle East and Southeast Asia. Saffron is cultivated in different parts of the world, but currently mainly in Iran. In view of its wide range of medical uses, the saffron has undergone extensive phytochemical and biochemical studies and variety of biologically active ingredients has been isolated. According to Unani system of medicine, it is considered hot and dry, reported to reduce inflammation and used as stimulant and stomachic. It is considered a good remedy for enlargement of liver and infection of urinary bladder and kidneys. Administered in high doses it makes patient unconscious. It is an ingredient of recipes useful in menstrual disorders. It strengthens the heart and is a refrigerant for the brain. If soaked overnight in water and administered with honey it acts as diuretic. Pounded with ghee it is used in diabetes. Saffron oil is used for external application in uterine sores. Remnant water after extracting oil from it is also used as medicine. During the last decade, from different laboratories in the world, data were reported on the effect of saffron on coronary artery diseases; on learning behavior; on ocular blood flow and retinal function; on blood pressure; on contraceptive, anti-inflammatory and antiatherosclerosis activities; antigenotoxic and cytotoxic activities.

#### **Properties of Saffron:**

Saffron contains many plant derived chemical compounds that are known to have anti-oxidant, disease preventing and health promoting properties. The flower stigma are composed of many essential volatile oils but the most important being saffranal, which gives saffron its distinct hay-like flavor. Other volatile oils in saffron are 3, 5, 5-trimethyl-4-hydroxy-1-cyclohexanone-2-ene, cineole, phenethenol, pinene, borneol, geraniol, limonene, p-cymene, linalool, terpinen-4-oil, etc. This spice has many non-volatile active components; the most important of them is a-crocin, a carotenoid compound, which gives the stigmas their characteristic golden yellow color. It also contains other carotenoids including zeaxanthin, lycopene,  $\alpha$ - and  $\beta$ -carotenes. These are important antioxidants that helps protect body from oxidant induced stress, cancers, infections and acts as immune modulators.

#### **Various studies done on saffron:**

In May 2010, a small trial was published in the journal of *Nutrition Research*. In the study, a natural medicine by the name of *Satiereal* was under investigation as a satiety enhancer. The active ingredient in *Satiereal* is *Crocus sativus* or saffron. Why test the hunger suppressing effects of saffron? The authors of the study report that saffron appears to possess a "mood-improving effect" which they hypothesized would result in reduced appetite and snacking.

To test this theory, 60 overweight women were enrolled in an 8 week placebo-controlled trial. Twice-daily, the women were provided with 1 capsule of *Satiereal* (176.5 mg/day) or an inactive placebo. All of the test subjects were asked to eat an unrestricted, normal diet. After two months, the participants using the saffron extract reported a decline in snacking and lost more weight than the control group. None of the women dropped out of the study due to side effects. (1)

It's no exaggeration to say that hundreds of published studies attest to the psychoactive properties of this medicinal herb. Saffron can't hold a candle to

the sheer volume of research conducted on St. John's wort. But the studies that have been published illustrate real promise in the field of mood disorders. (2)

Several of the more interesting trials involving saffron have compared it to conventional antidepressant medications: fluoxetine (Prozac) and imipramine (Tofranil). What's more, all of the head-to-head studies utilized the preferred double-blind, randomized design which tends to yield the most reliable results.

An 8 week trial involving 40 clinically depressed patients found that 30 mg/day of saffron extract was equally effective as 20 mg of fluoxetine. In addition, both treatment groups demonstrated an identical remission rate of 25%. (3)

A 6 week trial also compared a "hydro-alcoholic" saffron extract with fluoxetine/Prozac. Once again, 40 patients with major depression participated in the experiment. The efficacy of saffron was found to be "similar to fluoxetine in the treatment of mild to moderate depression". No significant differences in side effects were noted between the two treatments. (4)

~~The September 2004 issue of the journal~~ *BMC Complementary and Alternative Medicine* matched saffron vs. imipramine. Over the course of 6 weeks, 30 patients with clinical depression were asked to take either 30 mg/day of saffron extract or 100 mg/day of imipramine. Both treatments provided comparable symptomatic relief. However, the saffron extract was less likely to cause select adverse reactions – dry mouth and sedation. (5)

Two other trials from 2005 and 2006 examined the efficacy and safety of saffron vs. a placebo. In both instances, the depressed patients receiving saffron demonstrated better outcomes as assessed by improvements on the Hamilton Depression Rating Scale. The side effect profiles were deemed equivalent. (6,7)

Stress related overeating and snacking are hallmarks of the current obesity epidemic. Preliminary experiments in animal models point to an anxiolytic effect of saffron and its components. The first observation made was that a water-based extract of saffron reduced anxiety and increased total sleep time in mice. Further testing in rats identified two phytochemicals contained in saffron, *crocin* and *saffranal*, which appear to be partially responsible for the relaxing and sleep enhancing effects. (8,9)

Other mind-body conditions including premenstrual syndrome (PMS) may also respond to saffron therapy. The administration of 30 mg/day of saffron over the course of two menstrual cycle's significantly improved PMS discomfort in a group of women aged 20 to 45. The symptomatic relief was evidenced via changes in two objective measures: a Daily Symptom Report and the Hamilton Depression Rating Scale. The authors of the study urge further investigation into the applicability of saffron as an alternative treatment for PMS. However, they also emphasize the need to firmly establish the safety of chronic saffron use. (10)

The issue of safety cannot be overemphasized. Thus far, the majority of research published on saffron has reported an acceptable safety profile. But this appears to be mostly based on the subjective responses of the study volunteers. By that, I mean reports of adverse reactions such as dry mouth, headaches, nausea and the like. Unfortunately, blood tests and other laboratory indicators were not regularly employed in the studies I reviewed. The one exception is a safety trial that involved 30 men and women who were given a placebo or 200 mg to 400 mg of saffron daily for one week. Various blood tests, blood pressure and electrocardiographic parameters were reviewed in the analysis. Both dosages of saffron exhibited some potentially positive activity – improvements in mood and significantly lower arterial and systolic blood pressure. However, there were also a few distressing signs: a slight reduction in red blood cells, hematocrit, hemoglobin and platelets. There were also indications of possible kidney stress as evidenced by increased blood urea nitrogen and creatinine. The conclusion of the experiment states that "these alterations were in normal ranges and they were not important clinically". The higher dosages used in the safety study should also be taken into account. Nonetheless, this important reminder that even natural supplement need to be used cautiously and evaluated objectively. (11)

According to the British Journal of Obstetrics & Gynecology, taking 15 milligrams of *Saffron* twice a day for two cycles has improved in both PMS (Premenstrual Syndrome) and depression symptoms after one cycle and improved further after two cycles had 50% or greater reduction in PMS symptoms, while only 8% of the women in the placebo group had similar improvement.(12) Another recent study published in "Cancer Detection and Prevention" *Saffron* was touted by researchers for its anti-tumor benefits and cancer prevention properties, due in part to its high content of carotenoids. Prior studies have looked at lycopene and beta-carotene in particular.(13)

The golden herb Saffron may hold the key to preventing the loss of sight (AMD), a world first trial by researchers at the University of Sydney and in Italy has found. The results were described as a breakthrough, with trial participants showing significant vision improvements after taking a Saffron dietary supplement tablet for three months. A clinical trial with patients suffering AMD in Rome has found early indications that treatment with a dietary supplement of saffron may cause damaged eye cells to recover.

“Measurements using objective eye sight tests showed patient’s vision improved after taking the saffron tablet. When they were tested with traditional eye charts, a number of patients could read one or two lines smaller than before, while others reported they could read newspapers and books again.” Professor Bisti singled out “saffron’s ‘anti-apoptotic’ properties - its ability to increase the availability of oxygen to the body and prevent cell death,” as a key factor in its beneficial effects.(14)

#### **CONCLUSION:**

The active components in saffron have many therapeutic applications in many traditional medicines as antiseptic, antidepressant, antioxidant, digestive, and anticonvulsant. This novel spice is a good source of minerals like copper, potassium, calcium, manganese, iron, selenium, zinc and magnesium. Potassium is an important component of cell and body fluids that helps control heart rate and blood pressure. Manganese and copper are used by the body as co-factors for the antioxidant enzyme superoxide dismutase. Iron is essential for red blood cell production and as a co-factor for cytochrome oxidases enzymes. It is also rich in many vital vitamins including vitamin A, folic acid, riboflavin, niacin, vitamin-C that are essential for optimum health.

#### **REFERENCES:**

1. Murray CJ, Lopez AD. Alternative projections of mortality and disability by cause 1990–2020: global burden of disease study. *Lancet* 1997; 24:1498–1504
2. Paykel ES. Depression: major problem for public health. *Epidemiol Psychiatr Soc* 2006; 15:4–10
3. Sarko J. Antidepressants, old and new. A review of their adverse effects and toxicity in overdose. *Emerg Med Clin North Am* 2000; 18:637–654
4. Schulz V. Safety of St. John’s Wort extract compared to synthetic antidepressants. *Phytomedicine* 2006; 13:199–204
5. Sanchez-Mateo CC, Bonkanka CX, Prado B, Rabanal RM. Antidepressant activity of some *Hypericum perforatum* L. fil. extracts in the forced swimming test in mice. *J Ethnopharmacol* 2007; 112:115–121
6. Xu C, Luo L, Tan RX. Antidepressant effect of three traditional Chinese medicines in the learned helplessness model. *J Ethnopharmacol* 2004; 91:345–349
7. Pfander H, Schurtenberger H. Biosynthesis of C<sub>20</sub>-carotenoids in *Crocus sativus*. *Phytochemistry* 1982; 21:1039–1042
8. Tarantilis PA, Polissiou MG. Isolation and identification of the aroma components from saffron (*Crocus sativus* L.). *J Agric Food Chem* 1997; 45:459–462
9. Addullaev FI. Cancer chemopreventive and tumoricidal properties of saffron (*Crocus sativus* L.). *Exp Biol Med* 2002; 227:20–25
10. Salomi MJ, Nair SC, Panikkar KR (1991) Inhibitory effects of *Nigella sativa* and saffron (*Crocus sativus*) on chemical carcinogenesis in mice. *Nutr Cancer* 16:67–72
11. Abe K, Saito H. Effects of saffron extract and its constituent crocin on learning behaviour and long-term potentiation. *Phytother Res* 2000; 14:149–152
12. M Agha-Hosseini, a L Kashani, b A Aleyaseen, et al. *Crocus sativus* L. (saffron) in the treatment of premenstrual syndrome: a double-blind, randomized and placebo-controlled trial. *British Journal of Obstetrics and Gynaecology*.2008.115: 515-4
13. Abdullaev FI. Cancer chemopreventive and tumoricidal properties of saffron *Crocus sativus* L. *Exp Biol Med* 2002;227:20–5
14. Professor Silvia Bisti of ARC Center of Excellence in Vision Science (The Visions Center) and University of L’Aquila, Italy. Professor Benedetto Falsini at Policlinico Gemelli, Italy. 5 February 2010

**Source of support: Nil, Conflict of interest: None Declared**