

## Historical uses of saffron: Identifying potential new avenues for modern research

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### Abstract

**Objective:** During the ancient times, saffron (*Crocus sativus* L.) had many uses around the world; however, some of these uses were forgotten throughout the history. But a newly formed interest in natural active compounds brought back the attention toward historical uses of saffron. Understanding different uses of saffron in the past can help us finding the best uses at present. In this study, we reviewed different uses of saffron throughout the history among different nations.

**Methods:** ISI web of Science and Medline, along with references of traditional Iranian medicine were searched for historical uses of saffron.

**Results:** Saffron has been known since more than 3000 years ago by many nations. It was valued not only as a culinary condiment, but also as a dye, perfume and as a medicinal herb. Its medicinal uses ranged from treating eye problems to genitourinary and many other diseases in various cultures. It was also used as a tonic agent and antidepressant drug among many nations.

**Conclusion(s):** Saffron has had many different uses such as a food additive and a palliative agent for many human diseases. Thus, as an important medicinal herb, it is a good candidate with many promising potentials to be considered for new drug design.

**Keywords:** Saffron, Iran, Ancient medicine, Herbal medicine, Traditional medicine

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## Introduction

Saffron is a spice derived from the dried stigmas of *Crocus sativus* Linné, which was known by ancient nations and has remained among the world's costliest substances throughout the history. The flower's natural fields are in the 30°- 40° North latitude. Its flowering period extends over 2 or 3 weeks in October or November (depending on geographical differences), in which the flowers are picked by hands; the dark red stigmas are separated manually and then they are dried. The stigmas from about 100,000 flowers are required to make a kilo of pure dried saffron (Claus, 1962; Abrishami, 1987; Abrishami, 1997; Dalby, 2000).

Saffron has been used by different nations for different purposes such as a spice, a dye and a perfume (Abrishami, 2004). During almost four millennia, saffron has had the largest number of application among all medicinal plants and has been used in the treatment of 90 medical indications (Ferrence and Bendersky, 2004). Nowadays, many researches are being done on therapeutic and other applications of this precious spice; thus, we have reviewed the modern studies in this regard (Bathaie and Mousavi). In addition, there have been some reviews about historical features and application of saffron (Ferrence and Bendersky, 2004; Giaccio, 2004; Schmidt, Betti *et al.*, 2007). However, a need for a comprehensive review about the saffron's uses by different nations throughout the history is obvious, especially when it comes to the medicinal and historical uses of Iranian saffron, as there is little known about it in the international literature. Understanding different uses of saffron in the past may help us find new ways of using it.

## Methods

ISI web of Science and Medline were searched for the historical uses of saffron. In

addition, reference books of traditional Iranian medicine and books on the history of saffron, along with internet websites were searched.

## Results

According to the historical findings, it is not clear that where was the first place that saffron was grown and which nation was the first one who used it. Thus the following order is according to the historical backgrounds of the regions or countries, not the priority of using saffron. Table 1 shows relatively all medicinal usages of saffron by various nations during the history.

### Saffron in the Middle East

Historical data show that saffron was used as a medicine in the Fertile Crescent between the Tigris and the Euphrates -where the first known complete civilization emerged. In Mesopotamia, saying magic words and performing symbolic gestures while prescribing and using drugs was a routine, they believed that these would give drugs the power to heal. Their materia medica was similar to other nations of the same time and consisted of substances from animal, vegetable and mineral kingdoms like fig, onion, garlic, saffron, mustard, myrrh, cypress, salt, milk, meat and fat of different animals, etc (Munby, 1992; Giaccio, 2004; Tolner, 2005; Pirnia, 2006).

Later Assyrians and Babylonians (2<sup>nd</sup> millennium BC (Blois and Spek, 2005)) used saffron in treatment of dyspnea, problems of head, menstruation, delivery and painful urination. The first documentation of saffron's medical use was found in Assurbanipal library (668-627 BC); in inscriptions dated back to 12<sup>th</sup> century BC (Ferrence and Bendersky, 2004; Tolner, 2005).

## Historical uses of Saffron

Table 1: Major medicinal application of saffron in ancient time.

|                                       |                                   |   |  |   |  |   |   |   |                         |
|---------------------------------------|-----------------------------------|---|--|---|--|---|---|---|-------------------------|
| <b>Immune System &amp; infections</b> | Immunostimulant                   | Anti-inflammation                                     | Arthritis & rheumatoid arthritis                     | anti-bacterial                                  | anti-fungal  |   |   |   |                         |
|                                       | Its topical use, healing wounds   | To refresh facial skin                                | To increase brightness of the body                   | To treat acne                                   | To treat erysipelas  | Diaphoretic                               | To treat purpura  | To treat eczema   |                         |
| <b>Skin</b>                           | Local using strengthen eyesight   | Useful in day blindness                               | To cure purulent eye infection                       | To treat corneal disease                        | Lacrimating  | Anti-cataract                             | To treat keratitis  |   |                         |
| <b>Vision &amp; eye</b>               |                                   |   |  |   |  |   |   |   |                         |
| <b>Reproductive System</b>            | Aphrodisiac                       | To treat impotency & as activator/generator of sperms | To facilitate hard delivery and delivery of placenta | To regulate menstrual cycle & dysmenhorea       |  | To cure uterus pain                       | Useful for uterus ulcers                                    | As an emmenagogue   |                         |
|                                       |                                   |   |  |   |  |   |   |   |                         |
| <b>Urinary Tract &amp; Kidney</b>     | Diuretic                          | Purifier of kidney and bladder                        | To cure infection of urinary tract                   | Plus honey, facilitates passage of renal stone  |  |   |   |   |                         |
| <b>Gastrointestinal Tract</b>         | Strengthening liver and stomach   | To cure obstructions inside liver and spleen          | To decrease appetite                                 | To treat enlarged liver & enlarged spleen       | To cure splenic disorders                                    | Carminative                               | To treat vomiting   | To treat dyspepsia  | To cure rectal prolapse |
|                                       |                                   |   |  |   |  |   |   |   | To tonify stomach       |
| <b>Respiratory System</b>             | Strengthening respiratory system  | To treat dyspnea                                      | Anti-asthma  | To treat cough                                  | Anti-pertussis   | To treat sore throat                      | To treat measles  | Its odor and oil are good for diaphragmitis and pleuritis |                         |
| <b>Cardiovascular System</b>          | Cardiotonic                       | Improving circulation                                 | Preventing coagulation                               | To decrease the resistance of coronary arteries |  | To help nutrients & drugs reach the heart |   |   |                         |
|                                       |                                   |   |  |   |  |   |   |   |                         |
| <b>Cycological Disorders</b>          | Against mental disorders &        | Relaxant  | Anti-stress  | Anti-depressant                                 | To elevate mood  | Anti-anxiety                              | Its topical use in Boiled water is good for severe insomnia |   |                         |
| <b>Central Nervous System</b>         | To cure obstructions inside brain | To protect brain from oxygen deprivation              | To treat neurasthenia                                | To treat apoplexy                               | Its topical use in Boiled water is good for severe headaches |   |   |   |                         |
|                                       |                                   |   |  |   |  |   |   |   |                         |
| <b>General Effects</b>                | Anti-spasmodic                    | To cure broken bones                                  | To treat catarache                                   | To treat tooth-ache                             | To cure edema  |   |   |   |                         |
|                                       |                                   |   |  |   |  |   |   |   |                         |
|                                       | To invigorate the body            | To strengthen senses                                  | Sedative & febrifuge                                 | To improve swellings & edema                    | Anti-poisonous   | To treat alcoholism                       | To treat insect bites & stings                              | Anti-diabetic   | To decrease lipids      |
|                                       |                                   |   |  |   |  |   |   |   | Against cold            |

### Saffron in Egypt

In ancient Egypt, (3100 BC – 476 AD) saffron was imported from Crete and one of its important uses was in medicine and was mentioned in 'The Ebers Papyrus'. It was used in the treatment of disorders of eye, menstruation and urinary system and also to induce labor (Sigerist; Tolner, 2005; Tolner, 2005). It is said that Cleopatra (69-30 BC (Wilson, 2006) used to bath in milk and saffron (Behnia, 1991).

### Saffron in Crete

One of the frescoes of Bronze Age (3000–1100 BC) at Akrotiri, Thera depicts *Crocus cartwrightianus* and its active principle, saffron (Ferrence and Bendersky, 2004; Papaodysseus, Fragoulis *et al.*, 2006) that is believed to be the wild saffron which is mostly distributed in Greece in Athica and the Cyclades region and is the ancestor of cultivated saffron (Kafi, Koocheki *et al.*, 2006). The fresco shows the line of saffron production: plucking blooms, collection of stigmas and offering them to a goddess. The lower part of fresco shows a woman who is using saffron for treatment of her bleeding foot. It's hypothesized that this fresco shows the importance of saffron and its medicinal use; it is also possible to think that the goddess gave saffron the curative power, or that she has given saffron to human as a gift (Ferrence and Bendersky, 2004).

In a fresco in the palace of Minos at Knossos (about 1700- 1600 BC), *Crocus sativus* is shown being picked by young girls and monkeys (Winterhalter and Straubinger, 2000).

### Greek saffron

In ancient Greece (about 2000 - 146 BC (Behmanesh, 1338; Munby, 1992; Blois and Spek, 2005)), Saffron was a royal dye and was used as a perfume in saloons, courts, theatres and bathrooms; later its use spread among ordinary people (Abrishami, 1987;

Dadkhah, Ehtesham *et al.*, 2003). Another use of saffron was as an herbal remedy (Dadkhah, Ehtesham *et al.*, 2003). Hippocrates (5-4<sup>th</sup> century BC), Erasistratus (4-3<sup>rd</sup> century BC), Diokles (3<sup>rd</sup> century BC) and Discorides (1<sup>st</sup> century AD) used saffron for medical purposes like treating eye diseases (painful eye, corneal disease and cataract, purulent eye infection), earache, tooth-ache, ulcers (skin, mouth, genitalia) and erysipelas; they believed that it has styptic and soothing properties (Ferrence and Bendersky, 2004; Giaccio, 2004; Tolner , 2005).

### Iranian saffron

The first fields of saffron were near Zagros and Alvand mountains during the Kingdome of Media (708- 550 BC (Shabani, 2001; Blois and Spek, 2005; Pirnia, 2006)), but there is not enough information about how they used saffron (Abrishami, 1997; Dadkhah, Ehtesham *et al.*, 2003; Abrishami, 2004). It is thought that ancient Persians were one of the first nations who cultivated saffron instead of using only the wild flower (Dadkhah, Ehtesham *et al.*, 2003). Nowadays Iran is the world's largest producer of saffron (about 85% of world saffron production) with the most production in Khorasan region (Dadkhah, Ehtesham *et al.*, 2003).

In ancient Persia, they used to disperse saffron, gold, flowers and sweets along the parade routes and in wedding celebrations. Another use of saffron was as an ingredient of incense, along with aloeswood (Oud) and ambergris (Abrishami, 1997).

Saffron was not only precious and valuable -they used it as a gift along with gold, but also was a spiritual item; so they used it to scent the body of dead people, to write the prayers and rulers' orders and also to paint the books (Abrishami, 1997). Saffron was named as Kurkum or Karkam during the Achaemenid dynasty (550 BC- 330 BC) and was used along with cardamom and

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cinnamon for preparation of refreshing and strengthening drugs. An inscription in one of Achaemenid king palaces showed that they used about 1 kg of saffron every day, for making saffron bread, in scented body oil for kings and as a dye for shoes and clothes of king and 'The Immortal Troop' (Abrishami, 1997; Abrishami, 2004).

During Parthian Empire (256 BC -224 AD (Colledge, 2005)) and Sassanid dynasty (226- 641 AD (Munby, 1992)) they used to export saffron to China, Rome, India and Greece amongst other goods (Abrishami, 1997). During Parthian dynasty, they used saffron among the ingredient of a royal perfume, facial refreshing oil for kings and ritual leaders and also in cooking (Dalby, 2000; Colledge, 2005). During Sassanid dynasty, they used to colour papers with saffron for playing chess; in addition, King Khosru Parvez (591-628 AD) ordered that his letters should be written on pieces of papers perfumed with rosewater (Golab) and saffron. They used saffron as an ingredient of various foods, for topping and for dyeing silk, fabric and rugs (Abrishami, 1987; Christensen, 2004).

Saffron found its way to Ferdowsi's epic poems (one of the most famous poets of Iran) as well. For example when Freidoon triumphed over Zahhak, he ordered that fire be lighted and ambergris and saffron be ignited. They also scattered saffron and coin around the street when they celebrated the winning of Rostam over Touranian. Another use of it was in hand and finger printing; like when Siavash's son was born, his mother put the hand of the son in saffron water and pasted it on a paper and sent the paper to Siavash (Ferdowsi, 2002).

The finger printing with saffron was a custom during Timurids Dynasty (14<sup>th</sup> – 16<sup>th</sup> century AD) as well; the kings used this way to accredit orders and contracts (Abrishami, 2004). They also used saffron and henna to make inks and colour the papers during

Timurids and Safavid (1500-1722 AD) Dynasties (Abrishami, 1997; Abrishami, 2004).

Saffron was still a routine gift in ceremonies during Qajar Dynasty (1794-1925 AD); but with increased import of cinnamon, saffron's uses declined and people used cinnamon in their food instead (Abrishami, 2004). Still nowadays saffron is an essential ingredient of many traditional dishes with rice (like Chelow Kabab) and deserts like saffron rice pudding (Sholezard), Sohan, Zulbia and Halva. In some regions of Iran, they also make saffron tee and saffron bread as well (Behnia, 1991).

One of saffron's important uses was in Traditional Iranian Medicine (TIM). Saffron is considered as hot and dry. Some of saffron's uses in TIM are described below (Hoseini, 1980; Khorāsāni, 1992; Avicenna, 1997; Zargari, 1997; Jorjani, 1998; Mir Heidar, 2004; Chaqmini, 2006):

General: invigorate the body, strengthen senses, elevates mood; if used with wine, it can both enhance the intoxication and prevent hangovers. Its odor is hypnotic. The external use of ground saffron is good for major external bleedings. It is anti-inflammatory and can be used for swellings, otitis and wounds. It has been one of the major components of strengthening drugs.

Cosmetics and skin: It can improve complexion and can be used for the treatment of erysipelas. Head and neck: It can be used to cure obstructions inside brain. If it is boiled, the topical use of its water is good for severe headaches and insomnia.

Eye: If used locally (collyrium), it can strengthen eyesight and can prevent it from being affected by morbid matters. It is useful in day blindness, lacrimation and keratitis. Also applying ground saffron over conjunctivitis can be useful. Another use of it can be in blue discoloration of the eyes due to some other ailments.

Heart: It is cardiogenic and can help other drugs reach the heart and other target organs easily.

Respiratory system: It can strengthen respiratory system. Its odor and its oil are good for diaphragmitis and pleurisy.

Gastrointestinal: It strengthens liver and stomach and can be used to cure obstructions inside liver and spleen. It is an emetic drug and can decrease appetite. With appropriate drugs, it is good for anal pain.

Joints: The local use of its water extract with appropriate drugs is good for gout and joints.

Genitourinary: It is a diuretic; also, it can purify kidney and bladder. If used with honey, it can facilitate passage of renal stone. Putting one stigma in urethra can cure obstructed urination. It is aphrodisiac. It can facilitate hard delivery and delivery of placenta; it can also cause abortion. It is good for uterus ulcers especially if used with wax or yolk and two times olive oil. With appropriate drugs, it is good for uterus pain. It can regulate menstrual cycle as well.

Saffron oil (mixture of saffron with six times (w/w) olive oil or sesame oil remaining for five days with daily stirring, and filtration after that) is a preparation that is sedative. It is also used locally for treatment of uterus and other organs ulcers. It is used for nose embrocation and is good for pleurisy. Saffron's leaves can be used to treat new wound and can prevent organs from being affected by morbid matters.

Saffron's side effect (headache and weakening of senses if used over a long period) can be prevented if used with *Pimpinella anisum* L. and *Sekanjebin*. Saffron's safe dose is less than 2 Dirham (about 6 g), if it is used in the amounts of 3 Dirham (about 9 g) or above, it can be lethal due to excess happiness and excitation.

### **Roman saffron**

In ancient Rome (753 BC- 364 AD (Munby, 1992; Blois and Spek, 2005)), saffron was used as a gift, perfume or dye of robe hems among royalty and later among ordinary people. They also used it to scent their public halls, baths and theaters and to spread it along parade routes (Abrishami, 1987; Abrishami 1997; Dalby 2000; Dadkhah, Ehtesham et al., 2003; Giaccio, 2004).

Other uses of saffron were in religious ceremonies (they burnt saffron as an offering to their gods and goddesses (Abrishami, 1997), in colored decorative (Dadkhah, Ehtesham et al., 2003) and as one of the ingredient of Amomum which was one of the main aromatics in a Roman wine recipe and a scent of men's hair. They also believed that adding saffron to their wine will prevent hangover (Dalby 2000; Winterhalter and Straubinger, 2000). Heliogabalus (202-222 AD) also used saffron baths (Behnia, 1991).

Saffron had medicinal uses as well. They used it to refresh facial skin, to relieve liver from the dominance of bile, to treat coughs and diaphragmitis, and as an eye anti-inflammatory agent (Abrishami, 1997).

### **Indian saffron**

Some believe that saffron was first introduced to India by ancient Persians (Dalby 2000); its exact date is unknown, but Wan Zhen (a Chinese medical writer), described Kashmiri saffron by 3<sup>rd</sup> century AD. A Buddhist legend dates saffron plantation there back to the 5<sup>th</sup> century BC (Dalby, 2000).

In ancient India, rich people used a lot of saffron to show their royalty; they used saffron perfume on the royal person or as an air freshener, they dyed their robes and even used it just as decor. The Indian nobility may have learned these costumes from the ancient Greeks and the Romans. Saffron is also an important part of traditional Indian celebrations like wedding ceremony where

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they use it as decor, as saffron paste for the bride and guests and in food and drinks.

Saffron has had a significant role in all religions branched out from Hinduism. It is essential in performing some rituals; the Buddhist monks have adopted saffron colour as the most important one. Saffron is used to anoint deities of Hindu pantheon and to dot forehead of a worshiper.

Another use of saffron has been in herbal formulations, Ayurvedic medicine and home remedies. Saffron is considered as tonic, immunostimulator, antipoisonous, aphrodisiac, cardiac tonic, livotonic, nervine tonic, carminative, diaphoretic, diuretic, emmenagogue, lactagogue, febrifuge, stimulant, sedative, relaxant, anti-stress and anti-anxiety. Therefore it can be used in a variety of diseases and conditions like (Ríos, Recio et al., 1996):

General: general debility, alcoholism, inflammation, diabetes, children's disorders of unknown etiology, insect bites and stings, edema.

Skin: acne, skin diseases and wounds. It also can give brightness to the body.

Head and neck: headache, depression, mental disorders, weak eyesight.

Respiratory: asthma, cough, sore throat and cold.

Gastrointestinal: enlarged liver, splenic disorders, vomiting and dyspepsia, prolapse of anus.

Genitourinary: infection of urinary bladder and kidneys, menstrual irregularity, dysmennhorea, impotency. It is also an activator/generator of sperms

Others: arthritis, apoplexy, neurasthenia.

### Saffron in China

Some historians believe that saffron first came to China with Mongol invaders (Abrishami 1987), but the Chinese were referring to saffron as Kashmiri origin plant in 3<sup>rd</sup> century AD (Dalby 2000). Saffron is now cultivated in China and named as hong

hua (紅花, 紅藍花), fan hong hua (番紅花) and zang hong hua (藏紅花). Saffron is used as a spice and to colour foods, it is also considered as an herbal remedy. It is warm and mostly is used with other herbal drugs. Its effects on body are as below (Chu; R.Howes, Perry et al., 2003; Mir Heidar, 2004):

It is a heart stimulant; it can decrease the resistance of coronary arteries and improve circulation. It can provide blood flow and nutrition to the heart. It can prevent coagulation and in large amounts can destroy blood clots.

If used in small amounts, it can increase circulation and the rhythmic contraction of the pregnant uterus, while large amounts can cause constriction and spasm of uterus. Therefore, it must not be used in heavy menses and pregnancy.

It can lower lipids and can be used as an anti-bacterial, anti-fungal, analgesic, diuretic, immune stimulant, anti-inflammatory, anti-spasmodic, emmenagogue and diaphoretic.

Saffron can protect brain from oxygen deprivation; it can be used in case of broken bones, dislocated joints, sprains, painful joints, purpura, eczema, rheumatoid arthritis, and measles; it can also be used for treatment of enlargement of the liver and spleen.

Saffron is also used in the treatment of disorders of nervous system. It can be used for relieving asthma, pertussis and inflammations and is good to tonify stomach.

### Modern saffron cultivation in Europe

Saffron cultivation in Europe declined after the fall of Western Roman Empire (5<sup>th</sup> century AD) and for several centuries saffron cultivation was rare. Saffron came back to Europe by the Muslim in 10<sup>th</sup> century AD (Abrishami 1987; Abrishami 2004). During the middle ages, saffron was rare and highly in demand; it was the reason of "Saffron War" in 14<sup>th</sup> century when a shipment of saffron was hijacked. In Nuremberg of 15<sup>th</sup>

century, harsh rules such as pyre were set to prevent saffron adulteration (Winterhalter and Straubinger, 2000; Giaccio, 2004).

Saffron is one of the historical ingredients in European medicine and cuisine and nowadays the spice is still used for traditional fish and seafood dishes in Italy, France and Spain and is used in the German saffron cake 'Gugelhupf' (Abrishami, 1997; Winterhalter and Straubinger, 2000).

### **Spanish saffron**

Modern saffron cultivation in Europe began in Spain in the 10<sup>th</sup> century AD after Muslim campaigns in 712 AD. After conquering Iran, Muslims brought the knowledge of cultivating saffron from Persia to Spain. Later the proliferation of saffron began to spread throughout Europe (Abrishami, 1987; Abrishami, 2004). Today Spain is the biggest exporter of saffron in the world. It produces about 5 tons each year, but it also imports saffron from Iran, Greece and Morocco, to supply its market (Dadkhah, Ehtesham *et al.*, 2003). Every year, a saffron festival (Fiesta de la Rosa del Azafran) takes place in Spain, consisting of competition for the best saffron dish and saffron picking contest. In Spain there are many dishes which need saffron; the most important one is Paella (Abrishami, 1987; Winterhalter and Straubinger, 2000; Dadkhah, Ehtesham *et al.*, 2003).

### **England**

Although saffron was mentioned in a pharmacopoeia in the 10<sup>th</sup> century AD in England, data show that it was brought to England in the 14<sup>th</sup> century. In 16<sup>th</sup> century, a town in Essex changed its name to Saffron Walden where they cultivated and exported saffron. They also used it as a dye, a spice and for seasoning. Although nowadays saffron cultivation in this region is rare, there are still paintings of saffron flower in Parish Church and on guard clothes. There has been remained some recipes for saffron cakes and

breads for festivals and saints' days (Abrishami 1987; Robinson 1995; Abrishami 1997; Dadkhah, Ehtesham *et al.*, 2003; Abrishami, 2004).

Saffron has been mentioned in the Culpeper's Complete Herbal; where it has been written that saffron is growing mainly in Walden in Essex and in Cambridgeshire. Saffron was supposed to strengthen the heart (in normal amounts), quicken the brain, combat difficult breathing and jaundice (CULPEPER, 1652; Abrishami, 1997).

### **Other countries**

Some historical data show that first harvest of saffron in Turkey was about 13<sup>th</sup>-14<sup>th</sup> centuries AD. The town of Safranbolu took its name from saffron as it has been the main local producer (Abrishami, 1997).

Nowadays Iran is the first producer of saffron; other countries are: Spain, India, Turkey, Greece, Morocco, China, France, Italy, Germany, Japan, Russia and Pakistan (Dadkhah, Ehtesham *et al.*, 2003).

### **Conclusion**

Saffron is a spice known by many ancient civilisations for its various properties; especially the medicinal uses. Although some of them have been forgotten throughout the years, there is an increasing interest in re-understanding it. The results of this study can be helpful in using traditional medical knowledge for production of new modern drugs in the era of re-interest in herbal medicine.

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