

A REVIEW ON SAFFRON AS AN ALTERNATIVE THERAPY IN MEDICINE AND DERMATOLOGY.

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ABSTRACT

Saffron is a spice derived from flower *Crocus sativus* L., is an herbaceous perennial -cormous plant which is believed to show many pharmacological actions. The plant contains important constituents like crocetin, picrocrocin, safranal (main component for characteristic aroma). Safranal is the aglycon of picrocrocin; those are responsible for many pharmacological actions. In ayurveda, saffron is used to cure chronic diseases such as asthma, arthritis, skin diseases, spasmodic disorders, digestive disorders, digestive disorders, kidney disorders. Saffron is also useful in liver and spleen enlargement. Very few modern preclinical and clinical studies have been performed on the plant. In this review we have made an attempt to compile saffron as an alternative therapy in medicine and dermatology.

KEYWORDS: Saffron, *Crocus sativus*, Crocin. Picrocrocin.**INTRODUCTION**

Crocus sativus L. (Iridaceae), commonly known as saffron, is a perennial stem less herb that is widely cultivated in India and other countries such as Greece. Commercial saffron comprises the dried red stigma with a small portion of the yellowish style. It is in leaf from October to May. The flowers are hermaphrodite (have both male and female organs) and are pollinated by bees and butterflies. The plant prefers light (sandy) and medium (loamy) soils and can also grow in nutritionally poor soil. The flower has three stigmas which are the distal ends of the plant's carpels. Together with the style, the stalk connecting the stigmas to the rest of the plant are often dried and used in cooking as a seasoning and coloring agent. Saffron blooms only once a year and

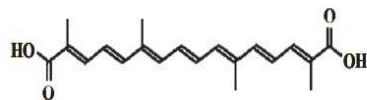
should be collected within a very short duration. It is picked during 3-4 weeks in October-November. This species is a sterile triploid and so does not produce fertile seeds. Germination can take 1-6 months at 18°C. It takes 3 years for plants to flower from seed. Saffron is characterized by a bitter taste or hay-like fragrance, which are caused by chemical picrocrocin.

**CHEMICAL CONSTITUENTS**

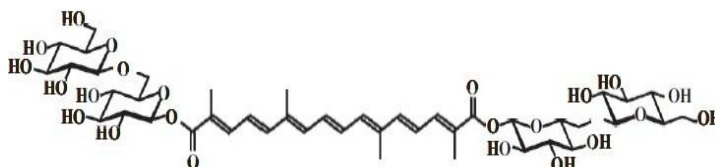
In view of its wide range of medical uses, the saffron has undergone extensive phytochemical and biochemical

studies and variety of biologically active ingredients has been isolated. Characteristic components of saffron are crocin (responsible for the color), picrocrocin (responsible for the bitter taste), and safranal (responsible for odor and aroma). Saffron contains more than 150 volatile and aroma-yielding compounds. It also has many non-volatile active components, many of which are carotenoids including zeaxanthin, lycopene, and various α - and β -carotenes. The volatiles with a very

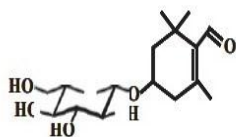
strong odor are consists of more than 34 components that are mainly terpenes, terpene alcohols and their esters. Non-volatiles include crocins, that are responsible for the red or reddish brown color of stigmas together with carotenes, crocetin, picrocrocin (a glycosidic precursor of safranal) the bitter substance and safranal the major organoleptic principle of stigmas. However saffron's golden yellow-orange colour is primarily due to α -crocin.



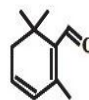
Crocetin



Crocin



Picrocrocin



Safranal

MEDICINAL PROPERTIES

1. Anticonvulsant activity (Abe K, Saito H. Effects of saffron extract and its constituent crocin on learning behavior and long-term potentiation. *Phytother Res.* Vol 14:149-52. (2000)

Crocetin is mainly responsible for the pharmacological activities. Three anticonvulsant evaluation tests namely the Pentylene-tetrazole (PTZ) seizure test, Maximal electroshock seizure test (MES) and Maximum non-fatal dose and acute toxicity are available. The ethanolic and aqueous extracts increased the latency of convulsions induced by PTZ dose-dependently, but failed to produce complete protection against mortality. Neither extracts had seizure-protective effects in the MES test. CSS delayed the onset of tonic convulsions, but failed to produce complete protection against mortality. Here safranal produces anti convulsant effect, not crocin.

2. Anticancer activity (Fernandez J A, Escribano J, Piqueras A, Medina J. A glycoconjugate from corms of saffron plant (*Crocus sativus* L.) inhibits root growth and affects in vitro cell viability, *J Exp Bot.* Vol 51:731-737, (2000)

Saffron and its characteristic components possess anti carcinogenic and antitumor activities in vivo and in vitro. It was shown that saffron extract and its purified characteristic compounds crocin, safranal, picrocrocin, and β -carotene inhibited different types of tumor cell

grow. It was report that a novel gluco conjugate isolated from corms and callus of saffron possessed cyto toxic activity against different tumor cells. Oral administration of saffron extract induced a dose-dependent inhibition of growth for ascite tumours. Saffron showed inhibitory effect of tested human malignant cells from different origin. Saffron extract had no effect on macromolecular synthesis neither in normal or malignant human cells in vitro, but exhibited a dose-dependent inhibitory on nucleic acid synthesis in the malignant cells. Crocetin inhibited the synthesis of DNA, RNA and protein in dose-dependent manner. The conversion of carotenoids to vitamin A was not a prerequisite procedure for the anticancer activity. Saffron contains lectins which mediate the anti tumour activity. Treatment of tumor cells with saffron resulted in an increase in the level of intracellular sulfhydryl compounds. Saffron has a significant role against liver cancer. Anticancer mechanisms of saffron and its main constituents are still largely unclear.

3. Anti-inflammatory effect (Hosseinzadeh H, Ramezani M, Salmani G A. Antinociceptive, anti-inflammatory, *J Ethnopharmacol.* Vol 73:379-385, (2000)

The anti-inflammatory effects of the extracts may be due to their content of flavonoids, tannins, anthocyanins, alkaloids and saponins. Only the stigma extracts showed

weak to moderate effect against acute inflammation. In chronic inflammation, both aqueous and ethanolic stigma extracts, as well as ethanolic petal extract, exerted anti-inflammatory effects but aqueous petal extract did not exhibit significant anti-inflammatory activity. In higher doses, the aqueous and ethanolic extracts of stigma showed significant activity against the acute inflammation. It is concluded that saffron stigma and petal aqueous and ethanolic maceration extracts shows acute or chronic anti-inflammatory activity.

4. Anti-depressant (Dharmananda, S, "Saffron: An Anti Depressant Herb", Institute for Traditional Medicine, (2005)

A number of recent preclinical and clinical studies indicate that stigma and petal of *Crocus sativus* have anti depressant effect. The clinical findings suggest that saffron is a safe and effective anti depressant.

5. Relaxant activity (J Pharma Pharmacol, Vol 58(10):1385-90, (2006)

The effects of aqueous ethanolic extract of *Crocus sativus* were studied on the tracheal chains of guinea-pigs for its relaxant activity. The relaxant effect of the extract may be due to the safranal present in the *Crocus sativus*. The results indicated that safranal was, at least in part, responsible for the relaxant effect of *Crocus sativus*.

6. Antihypertensive activity (J. Ethnopharmacol. Vol 84(2-3): 199-203, (2003)

The effect of aqueous and ethanol extracts of *Crocus sativus* petals is done on the isolated rat vas deferens and guinea-pig ileum induced by Electrical field stimulation (EFS) for their antihypertensive activity. Aqueous and ethanol extracts of *Crocus sativus* petals reduced the blood pressure in a dose dependent manner.

7. Anti tussive activity (Fitoterapia. Epub, Vol 77(6): 446-8, (2006)

The ethanolic extract of saffron and safranal reduced the number of cough. The ethanolic and aqueous extracts of petal and crocin did not show anti tussive activity.

9. Anti hyper lipidemic activity (Xu GL, Yu SQ, Gong ZN, et al. Study of the effect of crocin on rat experimental hyperlipidemia and the underlying mechanisms, Zhongguo Zhong Yao Za Zhi, Vol 30:369-72, (2005)

The anti hyper lipidemic effect is due to the crocin present in the *Crocus sativus*. Studies about hyper lipidemic effect was carried out in rats.

10. Emmenagogue

Saffron stimulate menstrual flow in women that is, stimulate blood flow in the pelvic area and uterus, who would normally be having a period (not pregnant). These drugs can also help to restore a normal cycle for those with missed or irregular periods (amenorrhea). So they stimulate menstruation. *Crocus sativus* has hot and dry qualities, stimulant or inebriant depending on dosage.

Sun dried filaments which are ingested that strengthen the uterus and treat menstrual problems, stimulates sexual desires for women. It also soothes lumber pains, which accompany menstruation. Saffron is also beneficial in the treatment of other ailments concerning women such as leucorrhoea and hysteria. Peccaries of saffron were used in painful conditions of the uterus.

DERMATOLOGICAL USES



✓ Skin cancer

The incidence of skin cancer is increasing worldwide. Over the past several decades, attention has been focused on understanding the molecular basis of skin carcinogenesis and identifying substances for use in chemoprevention of skin cancer. Reactive oxygen species generated by chemical carcinogens or UV irradiation play a key role in skin tumorigenesis. Multiple lines of evidence suggest that cellular antioxidant or phase-2 detoxification enzymes, collectively known as cyto protective proteins, can protect against skin carcinogenesis. These days cancer chemoprevention is recognized as the most hopeful and novel approach to prevent, inhibit, or reverse the processes of carcinogenesis by intervention with natural products. Considerable efforts have been done to identify the phytochemicals which may possibly act on one or several molecular targets that modulate cellular processes such as inflammation, immunity, cell cycle progression, and apoptosis. Saffron can be used in the treatment of skin cancer, which is a natural product.

✓ Antioxidant

Crocus sativus show high superoxide dismutase activity. The saffron has free radical scavenging effect. These activity of saffron is found in petals, stamens and entire flowers, which were waste products in the production of saffron and produce antioxidant properties on Abeta fibrillogenesis. The water: methanol (50:50, v/v) extract of *Crocus sativus* stigmas possesses good antioxidant properties. *Crocus sativus* stigma constituents for inhibition of aggregation and deposition of Amyloid beta in the human brain.

✓ Natural Sunscreen

Prolonged sun exposure is extremely harmful as it brings the skin in contact with UV rays that are known to cause severe damage to the skin. Saffron is known to have anti solar effects that can protect the skin against harmful UV rays. Studies show that saffron lotion could act as a

better anti solar agent compared to homosalate (an organic compound used in some sunscreens). Thus, saffron can be used as a natural UV absorbing agent.

✓ **Reduces Dark Patches**

Saffron is known to reduce the pigment called melanin. Thus it is very effective as a skin lightening agent through various cosmetic formulations. Facials with a cream containing saffron can reduce dark patches and give glowing skin.

✓ **Skin Diseases**

Saffron is known to reduce a skin condition called *erythema*, which is characterized by inflammation, redness or rash. Saffron is rich in antioxidants that are believed to inhibit the expression of markers of inflammation such as tumor necrosis factor (TNF) and interleukin.

✓ **Effective toner**

Saffron acts as an effective toner for skin and reduces pore size. It is best to use some rose water mixed with saffron after exfoliation of skin.

✓ **Prevents Acne**

Saffron is known to possess good anti-bacterial properties and thus can effectively reduce acne breakouts. Importantly, saffron is not reported to cause any skin irritation and thus appears to be safe for sensitive skin.

✓ **Perfumery**

The saffron threads were a key component of an aromatic oil – crocinum which comprised such motley ingredients as alkanet, dragon's blood and wine (for colour). Crocinum was applied as perfume to hair. Another preparation involved mixing saffron with wine to produce a viscous yellow spray.

✓ **To remove tan**

Soak saffron in milk cream or *malai* and steep overnight. Blend this in the morning with fingers and apply on the affected area. This will lighten the tan effectively. It has the added benefit of glow to skin as well.

CONCLUSION

Given its therapeutic and economic importance, its natural abundance, in addition to its common usage in ethnic medicine, saffron provides a varied and accessible platform for phytochemical-based drug discovery. A consolidation of its traditional usage as well as its chemical and pharmacological profiles will thus guide efforts aimed at maximizing this potential. A stronger focus on clinical studies and phytochemical definition will be essential for future research efforts. Apart from its common dermatological uses it can also be an alternative for medicinal purposes.

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