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SAFFRON AND ITS APPLICATION IN MEDICINE

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ABSTRACT: - This article describes the saffron plant and its medicinal properties, chemical properties, application in medicine and examples from experiments conducted by scientists on it.

KEYWORDS: Saffron, crocin, crocetin esters, safranal, picrocrocin, nutraceutical, therapeutic properties, functional food

INTRODUCTION

Saffron is considered to be the worlds most expensive spice. The flower of Crocus sativa is a light purple, but it is the thread-like reddish colored stigma of the flower that is valued both as a spice and as a natural colorant. Saffron is hand harvested in the autumn, and the stigma is laboriously separated to yield the reddish colored spice. It takes in excess of 70,000 flowers to yield just one pound (0.45 kilo) of saffron spice. The odor of saffron is sometimes described as like the "sea" air. The natural color is a powerful yellow in applications such as for saffron rice. Saffron Flower Saffron being Harvested Separation of the colorful stigma While the color is mainly due to the degraded carotenoids (crocin and crocetin), the flavor comes from the carotenoid oxidation products. It was proposed by Pfander & Schurtenberger that the biogenesis of the color principles and odor active compounds is derived by bio-oxidative cleavage of Zeaxanthin.

Chemical composition of saffaron. Chemical composition analyses have revealed a saffron composition of approximately 10% moisture, 12% protein, 5% fat, 5% minerals, 5% crude fibre, and 63% sugars including starch, reducing sugars, pentosans, gums, pectin, and dextrins (% w/w). Trace amounts of riboflavin and thiamine vitamins have also been identified in saffron. Ranges of all chemical constituents can vary greatly due to growing conditions and country of origin. Various analytical studies have been conducted to characterize the large number of potential biologically active compounds found within saffron. The four major bioactive compounds in saffron are crocin (mono-glycosyl or di-glycosyl polyene esters), crocetin (a natural carotenoid dicarboxylic acid precursor of crocin), picrocrocin (monoterpene glycoside precursor of safranal and product of zeaxanthin degradation), and safranal, all contributing not only to the sensory profile of saffron (color, color, taste, and aroma, respectively), but also to the health-promoting properties. Saffron's name is derived from the Arab word for yellow, a name reflecting the high concentration of carotenoid pigments present in the saffron flowers' stigmas which contribute most to the color profile of this spice. Both lipophilic carotenoids and hydrophilic carotenoids have been identified in saffron. The lipophilic carotenoids, lycopene, α-, and βcarotene, and zeaxanthin have been reported in trace amounts. Of the carotenoids, the hydrophilic crocins constitutes approximately 6 to16% of saffron's total dry matter depending upon the variety, growing conditions, and processing methods. Crocin 1 (or α-crocin), a digentiobioside, is the most abundant crocin with a high solubility being attributed to these sugar moieties. Crocin, typically deep red in color, quickly dissolves in water to form an orange colored solution thereby making crocin widely used as a natural food colorant. In addition to being an excellent colorant, crocin also acts as an antioxidant by quenching free radicals, protecting cells and tissues against oxidation.

Biological activity of saffron. In traditional Eastern medicine, saffron is commonly used for the treatment of gastric disorders. Some studies highlighted the effects of saffron as a potential anti-ulcer agent in mice. The study investigated the effectiveness of three different treatments (ethanolic saffron extract, commercial crocin, and commercial safranal) and determined that all three components demonstrated anti-ulcer activity similar to that of omeprazole, a proton pump inhibitor used to treat peptic ulcer disease. Saffron, crocin, and safranal displayed antioxidant properties that reduced ulcer formation by preventing indomethacin-induced gastric mucosa damage by increasing glutathione levels and preventing lipid oxidation. Results showed that crocin prevented damage to the stomach mucosa while damage was observed in the indomethacin-treated control rats..

Saffron in medicine. Saffron (Crocus sativus) is a plant. The dried thread-like parts of the flower (stigmas) are used to make saffron spice, food coloring, and medicine.

Saffron contains chemicals that might alter mood, kill cancer cells, decrease swelling, and act like antioxidants. It can take 75,000 saffron blossoms to produce a single pound of saffron spice. Saffron is largely cultivated in Iran and harvested by hand. People commonly use saffron for depression, anxiety, Alzheimer disease, menstrual cramps, premenstrual syndrome (PMS), and many other conditions, but there is no good scientific evidence to support many of these uses. The spice saffron is made from the dried stigmas of the plant Crocus sativus L. The main use of saffron is in cooking, due to its ability to impart colour, flavour and aroma to foods and beverages. However, from time immemorial it has also been considered a medicinal plant because it possesses therapeutic properties, as illustrated in paintings found on the island of Santorini, dated 1627 BC. It is included in Catalogues of Medicinal Plants and in the European Pharmacopoeias, being part of a great number of compounded formulas from the 16th to the 20th centuries. The medicinal and pharmaceutical uses of this plant largely disappeared with the advent of synthetic chemistry-produced drugs. However, in recent years there has been growing interest in demonstrating saffron's already known bioactivity, which is attributed to the main components—crocetin and its glycosidic esters, called crocins, and safranal—and to the synergy between the compounds present in the spice. The objective of this work was to provide an updated and critical review of the research on the therapeutic properties of saffron, including activity on the nervous and cardiovascular systems, in the liver, its antidepressant, anxiolytic and antineoplastic properties, as well as its potential use as a functional food or nutraceutical.

Activity of Saffron in the Central Nervous System and the Peripheral Nervous System. Pharmacological effects on the CNS have been attributed to saffron and its metabolites, including a biological action on memory and learning, neurodegenerative diseases, depression and anxiety, among others. The biological activity of these molecules in this system have been studied for over two decades. These works are some examples of the profusion of literature supporting this bioactivity .

Effect on Memory and Learning . Neurodegenerative disorders are often associated with alterations of memory and .learning. Many people with Multiple Sclerosis (MS) experience a decrease in memory, although the risk factors for this have not been identified .Abe and coworkers attributed to crocetin esters an antagonistic action towards the potentiation induced by ethanol in the neurons of the hippocampus. They also suggested a possible mechanism of action on N-methyl-D-aspartate (NMDA) receptors, which are receptors of the neurotransmitter glutamate, with actions in neuronal plasticity and memory. Likewise, by studying the protective effects of an extract of saffron and its glycosidic crocetin esters, the authors concluded that it could prevent the impairment of learning and memory, as well as prevent damage by oxidative stress in the hippocampus as a result of chronic stress

Effect on Alzheimer's Disease . Alzheimer's is one of the most common age-associated neurodegenerative diseases and leads to a significant deterioration in cognitive function. It is characterized by the formation of brain plates loaded with polypeptide β-amyloid and prominent tangles of tau protein. In vitro studies have shown that a water methanol (50:50 v/v) extract of saffron and crocin at different doses, is capable of inhibiting the fibrillogenesis of amyloid β-peptide . Another mechanism involved in the anti-Alzheimer action of saffron is its inhibitory effect on the activity of acetylcholinesterase . There are also clinical findings that have shown effectiveness in mild to moderate Alzheimer's disease. Although more human clinical trials are needed, some studies have pointed to the neuroprotective character of saffron and its components, with effects being similar to those obtained with donepezil and nemantin in Alzheimer patients.

Effect on Parkinson's Disease .In addition to its therapeutic potential, crocetin has been shown to be potentially useful in reducing the risk of developing Parkinson's disease. In a study conducted by Ahmad and coworkers [91] on hemiparkinsonian rats, the intraperitoneal administration of several doses of crocetin over 7 days protected the levels of thiobarbituric acid, a reactive substance in the substantia nigra.

Effect on Cerebral Ischemia .The neuroprotective activities of saffron have been demonstrated in experimental models of cerebral ischemia. Saffron biocompounds are capable of attenuating all the alterations induced by ischemia, most likely due to its antioxidant properties. Vakili and coworkers, as well as other groups ,showed that when saffron extract (15, 30, 60, and 120 mg/kg) was administered before the induction of focal cerebral ischemia, it improved the neurobehavioral outcome (grip strength, spontaneous motor activity and motor coordination) and protected the functionality of antioxidant defense systems (glutathione peroxidase, catalase and SOD). Moreover, Zheng and coworkers observed that crocin reduced the oxidative damage in brain microvessels after the global model of cerebral ischemia. Safranal has been shown to protect the balance between oxidant and antioxidant systems, after an ischemia-reperfusion injury has been induced .

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