

## Saffron (*Crocus sativus* L.): A Promising Phytochemical Source for Cancer Prevention and Treatment

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### Abstract

Saffron, scientifically named *Crocus sativus* L., is a medicinal plant with high anti-cancer activity. Its distinct components like crocin, crocetin, safranal and others showed selective cytotoxicity on cancerous but not normal cells without inducing any toxicity like other standard anti-cancer agents. Saffron and its constituents are reported to suppress the growth of cancer cells, induce apoptosis, inhibit metastasis and angiogenesis. This has been supported by preclinical studies while in some human clinical trials, anticancer property of saffron has been confirmed along with the safe dosage. The review is an extensive look into the ability of different parts of *C. sativus* plant in fighting against cancer.

**Keywords:** Anti-cancer, Cancer prevention, *Crocus sativus* L., Natural compounds

### 1- Introduction

*Crocus sativus* L., a member of the Iridaceae family, is a perennial stemless herb cultivated for its dried, dark-red stigmas, commonly known as saffron. For many centuries, it has been used in traditional medicine and recently into limelight due to its potential anticancer properties. These anticancer attributes have been credited by saffron's rich antioxidants and other bioactive compounds that thwart cancer cell growth and metastasis. Also, this food spice has anti-inflammatory effects together with immunomodulatory

actions that contribute to cancer prevention and amelioration [1-3]. This review will look at the influence of different parts of *C.sativus* on cancer.

## **2- Anticancer Properties of Saffron Stigmas**

The dried stigmas of *Crocus sativus* are the most valuable part of the plant and have been extensively studied for their anticancer potential. The main bioactive compounds in saffron stigmas are crocin, crocetin, and safranal, which have demonstrated selective toxicity against cancer cells. These compounds inhibit cancer cell proliferation, trigger apoptosis, prevent metastasis, and block angiogenesis [4-6]. It has been shown that saffron extract from stigmas can be poisonous to various types of cancer cells such as those found in breast, prostate, lung and colon. Crocin is the main carotenoid found in saffron responsible for altering cell cycle regulation and inducing apoptosis in cancerous cells mediated by PI3K/Akt 12NF- $\kappa$ B or MAPK signaling cascades [6].

Additionally, according to some studies, Crocetin, a component extracted from Saffron flowers' stigmas, has been affirmatively declared as an inhibitor of both primary tumors growth and their spread within animal systems. It also lowers the expression matrix metalloproteinases (MMPs) that destroy extracellular matrix leading to metastasis.

Also, volatile compound known as Safranal present in Saffron has been studied for its anticancer properties. There are reports indicating that it induces apoptosis via increased production of reactive oxygen species (ROS) as well changes on proteins encoded by apoptotic genes [7,8].

## **3- Anticancer Properties of Saffron Petals**

The *C.sativus* petals have equally been studied due to their anticancer properties. Examination has shown that saffron petal extracts are cytotoxic to cancer cells [9]. Nonetheless, further research is needed in order to understand the nature of these effects and the compounds involved.

## **4- Anticancer Properties of Saffron Leaves and Corms**

There is scant literature on the anticancer potential of saffron leaves and corms. Additionally, it has been observed that some studies imply these plant parts might also have anti-cancer activities; but until more work is done in this direction, these findings cannot be substantiated or explained as to which compound takes part in such reactions [10].

## 5- Clinical Trials and Patents

Even though preclinical investigations have produced good results, there is need for more human clinical trials aimed at establishing the anti-cancer effects and safe dosage of saffron administration. An investigation done in Iran by Hosseini et al. reported promising findings in patients with liver metastases but stressed that their study involved a small population [11]. Thus, it can be inferred from these discoveries that saffron, as well as its components may serve as helpful adjuvants in the management of cancer. More patents have also been granted based on ways to enhance the pharmacokinetic profiles of saffron-based agents and optimize their action against malignancies.

## 6-Conclusion

*Crocus sativus* L. and its main constituents, particularly crocin, crocetin, and safranal from stigmas have shown promise as antineoplastic agents in preclinical studies and some clinical investigations. Nevertheless, larger-sample-sized human clinical trials are required to confirm safety and efficacy of saffron use for treating cancers; besides, there is need for further studies to tap into anti-cancer potential of other parts like petals of *Crocus sativus* plant.”

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