

# Exploring the Anticancer Potential of Natural Compounds in Traditional Chinese Medicine: A Mini-Review

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## ABSTRACT

Cancer is a deadly disease that is caused by multiple factors. There are various types of treatment methods, but nowadays researchers are focusing on the use of traditional Chinese medicine for the treatment of cancer. Traditional Chinese herbs have a wide range of anticancer properties. These herbs are widely used for the development of new drugs. The conventional treatment methods for cancer have side effects, whereas traditional Chinese medicines have slight or no side effects. That is why pharmaceutical companies are using of these natural products for drug development. This short review focused on different natural compounds, which are derived from traditional Chinese herbs. These compounds have antioxidants and antiproliferation properties which make them effective against cancer.

**Keywords:** Natural Compounds, Anticancer, TCMs.

## INTRODUCTION

Cancer is a disease that is caused by the involvement of different factors. These factors may include genetic as well as environmental factors. In cancer, cells start to grow out of control. This may be caused by metastasis, apoptosis, inflammation, cell proliferation, or the immune system. Cancer can be treated with chemotherapy, and radiotherapy but researchers are now focusing on using Traditional Chinese Medicine (TCM) as an alternative therapeutic strategies for cancer treatment. The use of TCM as an anticancer therapy is not a discovery; it has been used in China for thousands of years. TCM use is very beneficial, as it can act on various factors which are related to cancer development. The major advantage of TCM is that it has very slight or few side effects as compared to conventional methods of cancer treatment [1]. Various treatment techniques have been developed in the past, and researchers are working to develop new methods. Despite these therapeutic strategies, cancer patients are facing death due to this deadly disease [2].

This review focuses on the role of some natural herbs used in traditional Chinese medicine. Previously published articles were reviewed to analyze different herbs and their anticancer properties. In this review, various effects of TCM, such as anti-proliferation, anti-inflammatory, and anti-cancer, are described.

### **Historical background of TCMs**

Since the early ages, plants and herbs have been used as traditional medicines to cure multiple diseases all over the world. Plants are still being used to develop drugs. TCM is one of the oldest forms of traditional medicine which have been used in China for 2500 years approximately. In the TCM treatment method, different herbs and plants are used. Although TCM is an old therapy for treating cancer; it is still new in modern science. China is using TCM for cancer treatment, but now this traditional treatment method has started to be used in other parts of the world [3]. Though TCM is an older method for treating various diseases, still there is a need for further research to fully understand the molecular role of TCM.

### **Integration of TCMs with conventional cancer treatment**

Traditional Chinese medicinal herbs can be used as an alternative therapeutic strategy for cancer treatment, as it has a wide range of characteristics that show their anti-cancer ability. These natural compounds can be used in combination with other cancer treatment methods, as TCMs can aid in reducing the side effects of conventional treatment methods. Pharmaceuticals is also using natural herbs to discover new drugs. TCM is now in use to increase the effectiveness of chemotherapy. TCM also helps to reduce the side effects of chemotherapy [4].

This complementary method can overcome various problems faced by cancer patients during chemotherapy and radiotherapy. Hence, this alternative form of therapy can increase the effectiveness of conventional treatment methods and also reduce the harmful effects of drugs [5].

### **Effectiveness of TCM with less side effects**

The most advantageous effect of TCM is that it has very few side effects. TCM is also effective against multiple targets. It is also reported that the survival rate of patients were increased by TCM treatment because these medicines have no or slight side effects. Research confirmed that TCM herbs have high antioxidative properties, which help to prevent or treat cancer. Antioxidants have the potential to act against any change caused by DNA or protein damage. TCMs are also effective against cancer due to their antioxidative properties. The presence of phenolics, which acts as an antioxidant increases the potential of TCM herbs to prevent and treat cancer. Chemotherapy is the major treatment strategy for cancer, but the side effects of chemotherapy are the major concern. Along with the side effects of chemotherapy, there are also cancer types that show multi-drug resistance, which is also a serious challenge [6].

### **Anticancer property of natural compounds in TCMs**

The use of medicinal herbs to develop new drugs is in the rise. According to Newman et al., new drugs were developed from naturally occurring products from 1982 through 2002. For testing the anticancer properties of TCMs, different active compounds were evaluated [7]. Some of these isolated active compounds from traditional Chinese medicinal herbs are discussed in this review.



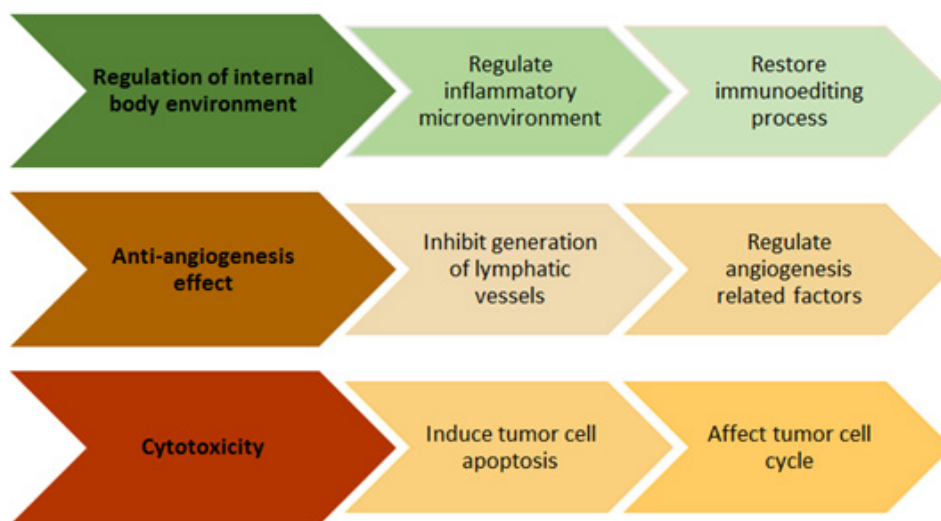
**Figure 1.** Various anti-cancer compounds derived from Traditional Chinese medicinal plants.

**Curcumin**

Rhizome of Chinese medicinal herb *Curcuma longa*, also known as Jianghuang in Chinese was used to derive a flavonoid named Curcumin. Curcumin has been used for the treatment of different diseases, such as cardiac diseases, arthritis, and inflammation. According to some epidemiological studies in India, the rate of various cancers has decreased due to the consumption of curcumin. The studies highlighted that curcumin can inhibit cell proliferation. Due to this, it is possible to survive against various cancers, such as lymphoma, breast cancer, prostate cancer, and colon cancer. Curcumin helps to reduce toxicity due to anti-cancer drugs. An anti-cancer drug

also has synergic effects along with various agents used in chemotherapy [8].

Cyclophosphamide (CXC) can cause oxidative stress and damage the DNA, to reduce the effects curcumin is very effective. Mitomycin C side effects are also alleviated by curcumin, which can cause DNA damage. Different studies conducted on animals also confirmed that curcumin can improve the functioning of the kidneys and also reduce weight. However, further research is necessary to confirm these effects on humans [9].



**Figure 2.** Potential mechanisms of Traditional Chinese Medicines.

### Silibinin

In Japan, China, and Germany, silibinin is used to treat hepatic diseases. Silibinin is obtained from a medicinal plant named *Silybum marianum* (Shuifeiji). It is a flavonoid that is effective against various cancers, including lung cancer, prostate cancer, bladder cancer and colon cancer. Precisely, silibinin is effective on the cells that are involved in invasion, migration, and metastasis [10].

### Oridonin

*Rabdosia rubescens* (Hensi) is used to isolate oridonin, which is a diterpenoid used for multiple effects. It can act against inflammation, bacterial infections, and tumor formation [11].

### Berberine

A Chinese medicinal herb named *Captidis rhizoma* (Huanglian) is used to derive berberine which is used for detoxification. This iso-quinoline alkaloid has multiple therapeutic activities. In China, berberine is mostly used against bacterial infections, and inflammation, and also to treat gastrointestinal infections. Studies also confirmed that berberine has anti-proliferation characteristics against cancerous cells. The sensitivity of chemotherapy and radiotherapy also increases the use of berberine in cancer treatment. It is an effective alternative treatment method for cancer [12].

### Triptolide

Triptolide is an active compound derived from *Tripterygium wilfordii* (Leigongteng). Triptolide is used for the treatment of autoimmune disorders and inflammation. It also has multiple responses including tumor formation, drug resistance, metastasis, and apoptosis [13].

### Artemisinin

*Artemisia annua* L. (Huanghuahao) is a traditional Chinese herb that is used to isolate an active terpene named artemisinin, which is used for the treatment of fever and malaria in China. Artemisinin and its derivatives (ARTs) also have anticancer properties [14].

### Ursolic acid

*Ligustrum lucidum* Ait. (Nuzhen) is used to derive a compound named ursolic acid. In humans, ursolic acid has the potential to inhibit proliferation in ovarian cancer [15].

### Emodin

*Rheum palmatum* L. is a medicinal herb that is used to isolate a natural anthraquinone compound named emodin, which can act against tumor formation in humans. Induction of apoptosis and cellular cycle arrest are also included in the functions of emodin. Cell growth to cause prostate cancer can be inhibited with emodin by regulation of androgen receptors [16].

### Shikonin

*Lithospermum erythrorhizon* (Zicao) is a natural herb that is used for the isolation of shikonin from its roots. Shikonin can induce apoptosis or inhibit cell growth, which shows the anti-tumor property of the shikonin [17].

### CONCLUSION

Traditional Chinese medicinal plants have a wide range of drug development capacity. These plants have been used since ancient times for the treatment of different diseases, such as heart diseases, intestinal diseases, arthritis, and cancer. This review focused on some Chinese herbs which have an effective anti-cancer property. TCMs are widely used in China and other parts of the world for their anticancer properties, but this alternative therapeutic method still needs further studies to enhance and increase the use of treatment methods that have fewer or no side effects.

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