

Research Status of Traditional Chinese Medicine in the Treatment of Breast Cancer

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Abstract. Breast cancer is a malignant tumor. It has high morbidity and mortality rates and is prone to metastasis and recurrence. At present, surgery, radiotherapy, chemotherapy and endocrine therapy are mainly used in clinical practice, but these methods are more damaging to the patient's body and are prone to toxic side effects. In recent years, with the continuous progress of precision treatment, traditional Chinese medicine has gradually emerged as an important approach in the management of breast cancer. This article is to review the research progress of traditional Chinese medicine in the treatment of breast cancer in recent years, including its treatment methods, mechanism of action, and clinical trial efficacy. Research has shown that traditional Chinese medicine has its unique advantages in treating cancer. Specifically, it can combine its advantages in disease differentiation, syndrome differentiation, and staged treatment with the individualized treatment needs of modern medicine. It can improve the clinical symptoms of patients, enhance the immune function of the body, and delay or prevent the development of diseases.

Keywords: Traditional Chinese Medicine, Research Status, Multi-target Therapy, Breast Cancer.

1. Introduction

According to research data, there were nearly 2.3 million new cases and nearly 700,000 deaths of female breast cancer in 2020, accounting for 24.5% of all new cases of female malignant tumors and 15.5% of deaths, surpassing other cancers such as lung cancer to become the world's largest malignant tumor [1]. In recent years, the 5-year survival rate of cancer patients has significantly improved. This is due to the deepening of people's understanding of breast cancer, the development of early cancer diagnosis technology, and the application of more new drugs and new therapies. However, it is not optimistic that the overall mortality rate remains high. According to statistics, the global cancer death toll is expected to reach 660000 in 2022, with an estimated 75000 cancer deaths in China[2].

In previous studies, it has been mentioned that traditional Chinese medicine can effectively improve the clinical symptoms and quality of life of cancer patients. With the deepening of people's understanding of traditional Chinese medicine in treating cancer, research and application are becoming increasingly widespread. An in-depth study of the treatment of breast cancer with traditional Chinese medicine will not only help improve the comprehensive treatment effect and survival rate of cancer patients in China, but also enrich cancer treatment strategies and provide more treatment options for cancer patients worldwide. Based on the existing research, this paper reviewed the main

methods, mechanism and clinical trial results of traditional Chinese medicine in treating breast cancer. The author specifically reviewed the current research status of traditional Chinese medicine in treating cancer, providing a basis for treatment of cancer with traditional Chinese medicine.

2. Main Methods in Treating breast cancer

Breast cancer can be classified as 'breast rock,' 'stone carbuncle,' and other categories in Chinese medicine, and its etiology is more complicated. It is mainly due to the dysfunction of internal organs of the human body, which leads to the disorder of qi and blood, stagnation of qi, blood stasis, phlegm congealment and other pathological products, and in the process of fighting with the evil qi, qi and blood disorder, phlegm and blood stasis are formed, and the pathological changes of depression and fire are caused by the long time. This results in disharmony of qi and blood, phlegm stasis and intermingling, as well as long-term depression and fire during the process of fighting against evil qi. TCM syndrome differentiation and treatment can be analyzed from both virtual and real aspects. For empirical evidence, the clinical practice is mostly characterized by phlegm and stasis interconnection, and the treatment is mainly to dissolve phlegm and remove stasis. For deficiency syndrome, the clinical practice mostly involves qi deficiency and blood stasis. In the treatment, it is essential to consider righteousness and dispelling evil. The primary focus should be on nourishing the spleen and kidney, as well as dispelling phlegm, blood, and stasis. In addition, attention should be given to caring for the liver and kidneys, replenishing qi and nourishing blood, strengthening the spleen and regulating qi, etc.

Traditional Chinese medicine and traditional Chinese medicine extracts have been widely used in clinical anti-tumor therapy. Currently, research has confirmed a series of effects of individual components in traditional Chinese medicine. For example, its anti-tumor effects are reflected in inhibiting tumor cell proliferation, inducing tumor cell differentiation and apoptosis, and inhibiting tumor angiogenesis [3]. The monomers and active ingredients of traditional Chinese medicine commonly used in clinical practice include puerarin, saikosaponin A, strychnine, ginsenoside pathway, powder prohexoline, etc. Puerarin inhibits proliferation and promotes apoptosis of breast cancer cells by inhibiting the NF- κ B and Erk signaling pathways [4]. Additionally, fenfluramine has been found to suppress tumor cell growth, angiogenesis, and multidrug resistance while enhancing sensitivity to radiotherapy and chemotherapy drugs through its promotion of autophagy and apoptosis [5].

At the same time, according to relevant studies and literature, it has been found that traditional Chinese medicine compounds also exhibit certain anti-tumor effects. Traditional Chinese medicine compounds are developed based on the theory of traditional Chinese medicine, which involves syndrome differentiation and examination of the underlying causes to determine the appropriate treatment method. These compounds are composed of two or more medicinal ingredients, with careful consideration given to their combination and dosage in accordance with the principles of monarch and minister in order to achieve optimal therapeutic effects. Its mechanism of action includes: 1. Promote apoptosis of tumor cells; 2. Inhibit the proliferation of tumor cells; 3. Inhibit tumor invasion and metastasis; 4. Regulate tumor microenvironment; 5. Regulate intestinal flora [6]. However, the effect of TCM compounds in the treatment of breast cancer is related to various factors such as the compatibility ratio, the method of formula, the patient's condition and age. Currently, the commonly utilized TCM compounds in clinical practice primarily consist of single herbs, with some applications involving compound compatibility. However, there remains a lack of systematic research on specific compatibility ratios. At the same time, exploring how to better integrate the anti-tumor mechanism of TCM compounds with clinical practice is also the direction that TCM researchers are trying to explore.

External treatments of Chinese medicine can also be used. Among them, acupuncture with auricular pressure beans is a traditional treatment method in TCM. This method is based on the auricular acupoint method, which is used to treat by stimulating specific acupoints in the human body [7].

3. Study on the Mechanism

3.1. Multi-target intervention

It has anti-tumor effects with multiple targets, pathways, and effects, which conforms to the network pharmacology characteristics of "multiple components, multiple targets, and multiple pathways." Many studies have combined traditional Chinese medicine with network pharmacology, clarifying the pharmacodynamic material basis, targets and mechanisms of traditional Chinese medicine, providing new insights for the research of cancer prevention with traditional Chinese medicine. Through research, it has been found that traditional Chinese medicine can exert anti-cancer effects by inhibiting relevant targets in breast cancer-related signaling pathways, thereby improving the prognosis of cancer patients. For example, in the study of the anti-tumour active ingredients in *Hemerocallis* according to network pharmacology, the active ingredients mainly act on key targets such as PTP1B, CA2, CDK2 and RXRA. This mechanism achieves inhibition of tumor angiogenesis and anti-inflammation by modulating the VEGF signaling pathway, the FcεRI signaling pathway, and the Foxo signaling pathway [8].

3.2. Anti-tumor microenvironment

The tumor microenvironment is the basis for tumor initiation, development, invasion and metastasis, and plays a role in promoting the growth, spread and metastasis of tumors. In recent years, traditional Chinese medicine has made certain achievements in the anti-tumor microenvironment, including anti-cytokine secretion, inhibition of angiogenesis and inhibition of immune cell function. Relevant studies have found that TCM can regulate the proliferation, apoptosis, migration, drug resistance, angiogenesis of the tumor microenvironment, and the immune system of breast cancer cells by influencing abnormal signaling pathways, such as Wnt/β-catenin, Bcl-2/Bax/cleaved Caspase-3, etc., and then play a role in the prevention and treatment of breast cancer [9].

4. Advances in Clinical Research

4.1. Overview of clinical trials

Clinical trials of integrated traditional Chinese and Western medicine, prospective clinical trials of integrated traditional Chinese and Western medicine, clinical trials of breast cancer as a single disease and multi-disease combination research, etc. are the main types of clinical trials of traditional Chinese medicine for the treatment of breast cancer. Furthermore, single Chinese medicine or single Chinese medicine plus chemotherapy drug regimen for the treatment of breast cancer; monotherapy regimens combined with chemotherapy regimens for the treatment of breast cancer are among the clinical trials of traditional Chinese medicine for the treatment of breast cancer that have been completed or are currently underway [10].

4.2. Clinical efficacy evaluation

In treatment, breast cancer is often divided into three stages, namely early, intermediate and advanced stages, according to the principle of "different treatment for the same disease" and "same treatment for different diseases," and the drugs are used according to different stages. According to the pathogenesis characteristics of breast cancer at different stages, breast cancer was divided into three syndrome types, namely, liver depression and spleen deficiency, phlegm and stasis mutual junction type, and liver and kidney deficiency type, and different traditional Chinese medicine prescriptions were used for different syndrome types. For example, the liver depression and spleen deficiency type are treated with qi replenishment and spleen strengthening method; the phlegm-stasis interjunction type is treated with the method of dissolving phlegm and dispersing the knot; the liver and kidney deficiency type is treated with the method of tonifying the kidney and benefiting the brain; the phlegm and stasis mutual junction type is treated with the method of nourishing qi and nourishing yin.

5. Challenges and Prospects

In recent years, the role of traditional Chinese medicine in clinical practice has been increasingly valued. The reason is that with the deepening of research on the mechanism of action of traditional Chinese medicine in treating cancer, the research on the combination of modern medicine and traditional Chinese medicine continues to deepen. At present, TCM has made some progress in the treatment of breast cancer, but further exploration is needed to establish its theoretical basis and clinical experience. It is therefore necessary to develop diagnostic standards and efficacy evaluation criteria that align with the theoretical framework of TCM, and unified TCM diagnosis and treatment guidelines and norms should be formulated. At the same time, it is necessary to strengthen the research on the mechanism and molecular targets of traditional Chinese medicine's anti-cancer effects. Based on this purpose, it is necessary to fully utilize modern technological means to analyze the active ingredients and biological activities of traditional Chinese medicine, in order to improve clinical efficacy. At present, it still faces numerous challenges and unresolved issues in the realm of breast cancer treatment. First of all, the understanding of the material basis of TCM pharmacodynamics is still limited, and the differences between different drugs have not been fully analyzed. Secondly, the mechanism of action of TCM is still unclear, and its interaction mode with cancer cells needs to be further elucidated. In addition, the efficacy evaluation system is also imperfect, and there is a lack of unified standards and quantitative indicators, making it difficult to accurately evaluate the treatment effect. With a deeper examination of traditional Chinese medicine's mode of action in breast cancer treatment, it is anticipated that traditional Chinese medicine will become more crucial in the fight against breast cancer.

6. Conclusion

With the extensive investigation of traditional Chinese medicine's role in treating breast cancer in contemporary medical research, people have started to pay attention to the anti-tumor active ingredients and their mechanism of action. Breast cancer is a malignant tumor that poses a serious threat to women's physical and mental health. The advantages of traditional Chinese medicine in the treatment of breast cancer have been highlighted more and more with the advent of immunotherapy and molecules targeted medications. Research on the use of traditional Chinese medicine to treat breast cancer has revealed that this medicine possesses multi-component, multi-target, multi-pathway, and multi-pathway anti-tumor properties. Additionally, traditional Chinese medicine is abundant in resources, predominantly natural drugs with minimal adverse reactions, which have the potential to ameliorate clinical symptoms and extend patient survival, ultimately enhancing their quality of life.

In summary, this article discusses the research status of TCM in the treatment of breast cancer from the aspects of treatment methods, mechanism of action, and clinical research progress, but there are still limitations and areas for improvement. In terms of research methods, although a wide range of literature has been reviewed, there is a lack of in-depth experimental verification and big data analysis, and empirical studies and clinical trials should be added in the future to strengthen the conclusions. From the perspective of research questions, the specific mechanisms of action of different formulas and monomers of traditional Chinese medicine can be further refined, as can their synergistic effects with existing therapies. Future research should focus on the in-depth exploration of the molecular mechanism of TCM treatment, the optimization of personalized treatment regimens, and interdisciplinary collaboration, so as to promote the innovation and development of TCM in the treatment of breast cancer.

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