

Advances in Traditional Chinese Medicine for Myelosuppression after Chemotherapy for Breast Cancer

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Abstract: *Breast cancer is the most common malignant tumor among women nowadays. It is characterized by complex conditions, numerous pathological and molecular types, significant differences in treatment efficacy, and rapid disease progression. Bone marrow suppression is the most common side effect after chemotherapy, which seriously affects the quality of life of patients and may even terminate their treatment plans. A large number of clinical experiments and data have proved that traditional Chinese medicine has a unique therapeutic effect in improving bone marrow suppression in breast cancer patients after chemotherapy, and can achieve the effect of enhancing efficacy and reducing toxicity, thereby helping to address the limitations of current Western medical treatment. This article reviews the etiology and pathogenesis, as well as the syndrome analysis of bone marrow suppression after breast cancer chemotherapy treated by traditional Chinese medicine, and summarizes the treatment methods such as internal administration and external treatment, aiming to provide new diagnostic and therapeutic ideas for subsequent clinical practitioners.*

Keywords: Breast cancer, Traditional Chinese Medicine, Chinese herbal medicine, Clinical treatment, Chemotherapy Bone marrow suppression.

1. Introduction

Breast cancer is a type of human organ, and due to differences in physical development, endocrine environment, and other factors between males and females, breast diseases are more common in women. Breast cancer is also one of the prevalent diseases among women, with its pathological nature being a malignant tumor occurring in the glandular epithelial tissue of the breast. According to the latest data from the International Agency for Research on Cancer under the World Health Organization, in 2022, there were 2.3 million new cases of breast cancer in women worldwide, ranking it second in global cancer incidence, only surpassed by lung cancer [1]. Statistical data released by the National Cancer Center in 2024 shows that in 2022, there were 511,700 new cases of breast cancer in women in China, making it the second most common malignant tumor in women and the fifth in terms of mortality [2]. In the treatment of breast cancer, multiple clinical studies have demonstrated that traditional Chinese medicine, when used in combination with radiotherapy, chemotherapy, targeted therapy, and endocrine therapy, can improve efficacy, reduce adverse reactions, and deliver reliable therapeutic outcomes [3]. Chemotherapy, as one of the primary treatment modalities, effectively enhances long-term survival rates in breast cancer patients. However, all chemotherapy regimens can induce toxic adverse events, thereby impairing patients' quality of life and treatment adherence [4]. Myelosuppression is one of the most common chemotherapy-related adverse reactions, which can trigger a series of clinical symptoms and, in severe cases, further increase mortality risk [5]. Over time, traditional Chinese medicine has become an indispensable component in the clinical management of myelosuppression.

2. Traditional Chinese and Western Perspectives on Bone Marrow Suppression After Chemotherapy

2.1 Western Medicine Etiology and Pathogenesis

The use of chemotherapy drugs in clinical practice easily leads to bone marrow suppression, which is mainly manifested in the aggravation of bone marrow fibrosis, the weakening of hematopoietic function, and the massive release of mature blood cells in bone marrow. The proliferation, maturation and release of bone marrow cells are related to the neutrophils in peripheral blood. Anticancer chemotherapeutic drugs can produce relevant effects in multiple links of the cancer cell proliferation cycle. Under the interference of drugs, the ability of DNA division and proliferation is inhibited, which affects microtubule formation, promotes microtubule disassembly, and finally leads to the antagonism of tumor cell mitosis. In addition, some chemotherapy drugs will also damage the DNA structure and affect DNA degradation and replication. Due to its low selectivity, it will also inhibit normal bone marrow cells, resulting in reduced activity, resulting in decreased expression of leukocytes and platelets, and decreased hemoglobin level. In breast cancer chemotherapy, anthracycline, platinum and purple shirt drugs are the main drugs, and the above drugs can reduce neutrophils, platelets and hemoglobin to a certain extent, and even threaten life in serious cases [6-7].

2.2 Traditional Chinese Medicine Etiology and Pathogenesis

The disease name of "bone marrow suppression" is not

recorded in the ancient books of traditional Chinese medicine. The main clinical manifestations of patients are as follows: dizziness, fatigue, palpitations, shortness of breath, spontaneous sweating, pale face, chilly, cold limbs, easy to get exogenous fever, etc., which can be summarized as “asthenia, blood deficiency, internal injury fever” and other categories. The term “asthenia” was first recorded in Synopsis of the golden chamber. Its basic pathogenesis is the loss of Zang Fu organs and the loss of both qi, blood and Yin and Yang. Modern medicine believes that it is mainly due to the deficiency of essence and blood and the imbalance of Ying and Wei [8]. Chemotherapy drugs are all toxic products in TCM cognition, which are called “drug poisons”. After entering the human body, the body is weak in vital qi and is unable to drive out pathogens, resulting in damage to the spleen and stomach of the middle energizer, dysregulation of the rise and fall of the Qi machine, loss of the function of the spleen and stomach, dysregulation of the liver and stomach viscera, and finally the lack of blood biochemistry. In addition, the disease will also cause a large loss of kidney essence, and the lack of kidney essence, the deficiency of marrow sea, and the deficiency of the body’s vital qi will affect the operation of Qi and blood, resulting in dizziness and fatigue symptoms [9-10]. Based on the overall concept of traditional Chinese medicine, syndrome differentiation and treatment, in the treatment of bone marrow suppression after chemotherapy, we can start with restoring the function of spleen and stomach transportation, and take supplementing qi and blood, supplementing essence and filling marrow as the treatment principle to relieve the symptoms of patients.

3. Traditional Chinese Medicine Treatment for Bone Marrow Suppression after Chemotherapy

3.1 Oral Decoctions

Decocting Decoction of Chinese herbal medicine is the most commonly used means of traditional Chinese medicine treatment. Chemotherapy drugs, as a kind of toxic pathogens, can damage the body’s healthy qi. The kidney is the basis of congenital, and the spleen and stomach is the basis of postnatal. Therefore, prescription drugs are often treated from the spleen and kidney. Modern people have different opinions on the treatment of bone marrow suppression after breast cancer chemotherapy with traditional Chinese medicine prescriptions, which can be divided into several treatments as a whole [11-12]. Ma Lu et al [13] intervened with guishaoshengbai formula in patients with bone marrow suppression after breast cancer surgery chemotherapy. The results showed that after 21 days of treatment, the TCM syndrome score of patients was significantly reduced, and the indicators of peripheral blood leukocytes, platelets, hemoglobin were higher than those of the control group, and the incidence of bone marrow suppression \geq grade III decreased, indicating that this treatment method can reduce bone marrow suppression and improve the prognosis of patients. According to pharmacological research [14-15], the effective ingredients in traditional Chinese medicine, such as angelica polysaccharide, can promote the proliferation of hematopoietic stem cells, and has significant blood enriching effect, which can reduce the blood deficiency state of patients and continuously restore the body’s healthy qi. In addition to

guishaoshengbai formula, there are ginseng Yangrong Decoction and Yiqi Yangrong formula in the oral decoction. Dongwenmin et al. [16] treated breast cancer patients with postoperative chemotherapy with Guben Kangai formula, which significantly reduced the clinical symptoms of patients, improved the quality of life of patients, improved blood cell abnormalities, alleviated bone marrow suppression, and reduced the dosage of GCS-F. Lilingsheng et al. [17] applied Bushen Yiqi formula to effectively prevent bone marrow suppression after chemotherapy for breast cancer, correct immune dysfunction after chemotherapy, and also improve symptoms such as shortness of breath and fatigue, palpitations and insomnia, dizziness, chilly limbs, waist and knee soreness, significantly improve the quality of life. Research shows that Bushen Yiqi formula can be used as a supplementary treatment for breast cancer patients undergoing chemotherapy.

3.2 Chinese Patent Medicine

Chinese patent medicine has been widely used in clinic in recent years because of its convenient use, including capsules, pills, tablets, oral liquids, injections, etc. At present, there are many Chinese patent drugs that can be applied to prevent and treat chemotherapy-related myelosuppression, such as oral preparation Qijiao, Shengbai capsule, Shengxuebao mixture, Diyu Shengbai tablets, etc. Zhang Min et al [18] treated breast cancer patients with bone marrow suppression after chemotherapy with Diyushengbai tablets combined with pegylated recombinant human granulocyte stimulating factor. The results showed that the total effective rate of the observation group was higher than that of the control group treated with western medicine alone, and the symptoms of the observation group were improved more significantly. Linhui et al [19] found that Shengxuebao mixture can reduce the degree of bone marrow suppression after chemotherapy for breast cancer and improve the blood routine level. The reason is that Sanguisorba officinalis in Sanguisorba Alba tablets can exert its advantages of heat clearing and detoxification, thereby improving bone marrow circulation and accelerating the proliferation and differentiation of hematopoietic stem cells; The drugs of Polygonum multiflorum and Ligustrum lucidum in Shengxuebao mixture can nourish the liver and kidney, activate blood circulation and promote qi [20]. Bone marrow hematopoietic tissues were effectively protected, and the degree of bone marrow injury caused by chemotherapy drugs was reduced, thus increasing the expression level of peripheral blood cells.

3.3 Acupuncture Therapy

Acupuncture is a kind of external treatment of traditional Chinese medicine, which has the effect of regulating the balance of yin and Yang and improving the function of viscera. Lu Shan et al [21] selected breast cancer patients with bone marrow suppression after chemotherapy as the research object, used warm acupuncture treatment, disinfected the skin corresponding to the acupoints, and applied moxibustion with moxa stick, once a day, for one cycle of treatment. The results showed that warm acupuncture could inhibit the reduction of white blood cells and neutrophils, and the symptom score of patients decreased, and the quality of life improved. This is because wormwood can unblock the twelve meridians, walk

the three yin, regulate qi and blood, so as to dredge the meridians and achieve the purpose of eliminating all diseases. Another study showed that [22-23], the incidence of leukopenia in patients with bone marrow suppression after tumor chemotherapy was reduced by acupuncture at Zusanli, Sanyinjiao and Zhongwan. In the theory of traditional Chinese medicine, blood biochemistry is closely related to the spleen and kidney, so selecting the acupoints on the spleen and kidney meridians and applying tonic techniques can promote the stimulation of meridians and Qi. This method can be selected for chemotherapy patients who resist oral administration of traditional Chinese medicine and have mild symptoms.

3.4 Ear Acupuncture

Auricular point therapy is widely used in TCM External Treatment with high safety. Yangxiuwen et al [24] used traditional Chinese medicine combined with auricular point magnetic therapy as a scheme to intervene patients with bone marrow suppression after chemotherapy, and the results showed that the total effective rate of patients was improved. The reason is that ear acupoints correspond to the organs in the body, which can improve the functions of the organs and regulate the balance of yin and Yang. However, the effect of this method is relatively slow, and it is not suitable for application alone. It can be combined with other therapies and can achieve good results [25-26].

3.5 Moxibustion Therapy

“The Great Compendium of Acupuncture and Moxibustion” states: “What acupuncture cannot achieve, moxibustion can.” Extensive clinical studies have shown that moxibustion can promote the proliferation of hematopoietic cells and effectively alleviate bone marrow suppression in cancer patients after treatment. Jiang Shuangfeng et al. [27] conducted a randomized controlled clinical trial, revealing that moxibustion (at acupoints such as Guanyuan, Qihai, Zusanli, and Zhongwan) to replenish qi and blood during chemotherapy for breast cancer patients can reduce the severity of neutropenia, shorten the recovery time of bone marrow suppression types I and II, and decrease the usage rate of granulocyte colony-stimulating factor.

3.6 Hot Compress with Traditional Chinese Medicine Heat Therapy Bags

Hot compress with traditional Chinese medicine heat therapy bags involves placing a bag filled with Chinese herbs that have the properties of warming yang, promoting blood circulation, strengthening the spleen and removing dampness on the patient's body surface acupoints. Under the effect of physical heat, the herbs vaporize and are absorbed through the skin and into the muscles, from the tendons to the bones, and from the outside to the inside, maximizing the absorption of the medicinal effects. This method has the advantages of being non-invasive, highly operable, safe and cost-effective, and is worthy of clinical application. Liu Qing et al. [28] divided patients with advanced breast cancer undergoing chemotherapy into two groups. The control group only received chemotherapy, while the observation group received hot compress with heat therapy bags made of Chinese herbs

such as *Evodia rutaecarpa*, *Foeniculum vulgare*, *Zingiber officinale*, *Citrus reticulata*, *Atractylodes macrocephala*, and *Hordeum vulgare* in addition to chemotherapy. They compared the bone marrow suppression conditions of the two groups of patients and found that the degree of bone marrow suppression in the observation group improved after treatment.

3.7 Soaking Feet in Traditional Chinese Medicine

The theory of “the method of meridian flow, injection and absorption” originated from the theory of “correspondence between heaven and man” in the Yellow Emperor's Inner Canon. The human body has five organs, six viscera, and twelve meridians. The course of these meridians corresponds to the time of day, such as the gallbladder meridian during the hour of the child and the lung meridian during the hour of the yin. However, this is only one aspect of things. Among these twelve meridians, there is another closely related part - the foot. The active ingredients in traditional Chinese medicine foot soaking soup, except for a few that are directly absorbed by the skin, are mostly absorbed through tissues such as the skin, sweat glands, and hair follicles, and then enter the body through fluid regulation and tissue metabolism. Cheng Menghui et al. [29] divided 55 patients diagnosed with breast cancer and receiving chemotherapy for the first time into two groups. The control group received routine treatment. The observation group, on the basis of the control group, carried out traditional Chinese medicine foot massage (30 g of argyi, angelica, and ginger granules each) plus acupoint massage (double foot Yongquan, Taixi, Zhaohai, Zusanli) according to the method of midnight noon ebb flow and branch absorption, once a day and seven days as a course of treatment. The results showed that the number of neutrophils and leukocytes in the observation group increased on the third and seventh days after chemotherapy, and the incidence of myelosuppression and the use rate of rhG-CSF were lower than those in the control group.

4. Summary

To sum up, traditional Chinese medicine can reduce the risk of bone marrow suppression in breast cancer patients after chemotherapy and reduce the degree of bone marrow suppression. It has the advantages of simplicity, convenience, cheapness, and experience. It has rich treatment methods, including oral decoction, Chinese patent medicine, acupuncture, ear acupoint therapy, etc., which can achieve the purpose of reducing toxicity and increasing efficiency, and has positive significance in improving the benefit of chemotherapy and the quality of life of patients.

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