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Research Progress on Erchen Decoction in Treatment of Respiratory Diseases

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Abstract: *Respiratory diseases are the most common diseases in China, and their prevalence is gradually increasing, seriously endangering public health. TCM dialectics are mainly related to the lungs and spleen, the lungs are "the main qi and breathing", the spleen is "the main movement", "the spleen is the source of phlegm", "the lung is the organ of phlegm storage", and the clinical treatment is often treated with "phlegm drinking" and "qi machine". Erchen soup was first seen in the Northern Song Dynasty's "Taiping Huimin and Pharmacy Bureau Fang", which is composed of banxia, orange red, white poria, licorice, ginger, and plum 6 flavored medicines, which have the power of drying and humidifying phlegm, rationalizing qi and neutralizing, and are the basis for treating all phlegm and dampness. Clinical studies have shown that the addition and reduction of prescription drugs to Erchen Tang, or in combination with other prescriptions, or in combination with conventional treatment of Western medicine, has a significant effect in the treatment of chronic obstructive pulmonary disease, lung cancer, chronic bronchitis, pneumonia, bronchial asthma, cough variant asthma and post-infectious cough and other respiratory diseases, and can effectively improve the symptoms and signs of the disease, shorten the course of the disease, and reduce the recurrence rate. This paper summarizes the relevant research progress in treating respiratory diseases in the past five years. It conducts a systematic review of Erchen Tang's prescription solution, pharmacological effects, clinical application, and pharmacological research, to provide a reference for clinical practice and further research.*

Keywords: *Erchen Decoction plus or minus; Respiratory diseases; Research progress; Summary; Clinical application*

1. Introduction

The high prevalence of respiratory diseases seriously endangers public health and brings a huge economic burden to society. The main lesions of this type of disease are in the trachea, bronchi, lungs and thoracic cavity, and are often accompanied by cough, sputum production, hemoptysis, chest pain, shortness of breath and other symptoms, and in severe cases, even cause respiratory failure and death [1]. Modern medicine mainly uses antibiotics, hormones and other drug treatments, and traditional Chinese medicine has significant efficacy in the treatment of a variety of respiratory diseases, which can improve clinical symptoms, improve clinical efficacy, shorten treatment time, and reduce the recurrence rate.

Traditional Chinese medicine dialectically believes that respiratory diseases are mainly related to the lungs and spleen, the lungs are "the main qi and breathing", the spleen is "the main transport", "the spleen is the source of phlegm", and "the lungs are the storage of phlegm". Evil qi invades the lungs, and the lungs lose their lungs, causing coughing, and the lungs are not declared, and the fluid is not distributed, and it gathers into phlegm; The spleen is lost, and the evil of damp phlegm and drinking is concentrated in the middle of the spleen, and the phlegm that floats in the lungs is phlegm. Respiratory diseases are mostly accompanied by cough and sputum production, and good curative effects can be achieved by treating them from "phlegm drinking" and "qi machine". Erchen Tang was first seen in the Northern Song Dynasty "Taiping Huimin and Pharmacy Formula", which has the effect of drying dampness and dissolving phlegm, regulating qi and neutralizing, and corresponds to the physiological and pathological characteristics of the lungs and spleen. Erchen decoction can be flexibly used in various respiratory diseases and can alleviate clinical symptoms such as cough, phlegm, and shortness of breath, with remarkable clinical efficacy. In this paper, we summarize the research progress of Erchen decoction in the treatment of respiratory diseases in the past five years discuss some theories, and summarize the

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pharmacological effects, clinical application and pharmacology of Erchen decoction as follows.

2. The solution and pharmacological effects of Erchen decoction

Erchen soup consists of "Banxia (soup washed seven times), orange red (five taels each), white poria (three taels), licorice (broiled, one or two halves)... Seven slices of ginger, one black plum". Fangzhong Banxia is warm and dry, which has the effect of drying and dampness, reducing phlegm, reducing inversion and stomach, dispersing knots and eliminating phlegm. Orange red is hard and warm and has the effect of regulating qi and stagnation, drying and dampness and dissolving phlegm. Poria cocos is sweet and light, infiltrating dampness and strengthening the spleen to be the source of phlegm. Ginger not only helps Banxia to reduce adversity, but also makes Banxia poison; A little black plum constricts the lung qi, and the middle summer is compatible, scattered, and harvested so that the expectorant does not hurt the positive. Boiled licorice has the effect of harmonizing various medicines. The original text records that Erchen Tang is mainly treated: with "Phlegm and drinking, or vomiting and nausea, or dizziness and palpitations, or unhappiness in the middle of the belly, or cold and heat, or disharmony due to food. " In addition to the symptoms of internal scorching the spleen and stomach, phlegm turbidity is the most common symptoms such as phlegm dampness and lung congestion, cough and phlegm asthma. All the evidence is caused by phlegm and dampness internal arrest and obstruction of qi, which can dry and damp phlegm, regulate qi, and treat it.

The medicinal components of Chen Tang have made certain developments in today's pharmacological research. Li Zhe [2] systematically sorted out the Banxia and showed that Banxia has a good antitussive effect, and the antitussive site is in the cough center, and it also has an expectorant effect. Modern pharmacological studies have shown that the volatile oil of tangerine peel not only has the effect of expelling phlegm and asthma, dilating the bronchi but also strengthens the stomach and digests food [3]. Modern chemical and pharmacological studies have shown that Poria cocos mainly contains triterpenoids and polysaccharides, which have anti-tumor, anti-inflammatory, and other pharmacological activities [4]. Ginger has antibacterial, anti-inflammatory, analgesic, and antitumor effects [5-7], which can improve the intestinal microbial diversity of mice, and has obvious therapeutic effects on acute lung injury [8]. The chemical components of Ume are organic acids, flavonoids, terpenoids, polysaccharides, etc., which have antibacterial, anti-inflammatory, and antitumor effects [9].

3. Clinical application and pharmacology research

3.1. Chronic obstructive pulmonary disease

Chronic obstructive pulmonary disease (COPD) is a heterogeneous lung disease characterized by chronic respiratory symptoms (difficulty breathing, cough, sputum) caused by airway abnormalities (bronchitis, bronchiolitis) and/or alveolar abnormalities (emphysema), leading to persistent, usually progressive airflow obstruction ADDIN. It has become the third leading cause of death in the world [10]. There is no corresponding disease name for COPD in traditional Chinese medicine literature, and its symptoms can be classified as "cough", "lung distension", and "wheezing". This disease is often caused by chronic lung deficiency, which affects the spleen and kidneys over time, leading to excessive phlegm dampness and obstruction in the lungs. Treatment is mainly focused on tonifying the lungs, spleen, and kidneys, clearing phlegm, turbidity, and blood stasis. Erchen Tang can dry dampness, regulate qi, eliminate existing phlegm, and penetrate dampness to strengthen the spleen and promote the generation of phlegm.

Although new studies have continuously discovered multiple methods that may become effective in treating COPD [11], modern medicine still lacks good drugs for treatment. The use of modified Erchen Tang in traditional Chinese medicine has shown significant effectiveness in treating chronic obstructive pulmonary disease. After a literature review and research, it was found that the clinical use of ErchenTang in the treatment of COPD is often combined with conventional Western medicine treatment, and the formula is often combined with Sanzi Yangqin Tang. Clinical studies have shown that Erchen Tang can alleviate the impact on lung function [12], facilitate sputum excretion [13], improve clinical symptoms, enhance clinical efficacy, and improve quality of life. Research by Yang Jiang [14] has shown that the combination of Er Chen Tang and San Zi Yang Qin Tang with conventional Western medicine is more effective in treating AECOPD than conventional Western medicine alone, with high safety. In recent years, there have been many studies on the mechanism of Erchen decoction in the treatment of COPD. It has been found that Erchen decoction has an anti-inflammatory effect in the treatment of COPD, which

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can regulate inflammatory factors through a variety of pathways to play an anti-inflammatory role [15-17], and can also prevent immune disorders caused by COPD [18].

In the past five years, Erchen decoction has been the most famous in the clinical research on the treatment of respiratory diseases. It has a good curative effect in both acute exacerbation and stable stages, which confirms the superiority of Erchen decoction in the treatment of COPD.

3.2. Lung cancer

Primary bronchial carcinoma (abbreviated as lung cancer) is the most common malignant tumor originating from bronchial mucosa or glands. Non-small cell lung cancer is the main type. Lung cancer can be classified into the categories of "lung accumulation" and "Pi Pi" in traditional Chinese medicine. Its pathogenesis is closely related to the lung and spleen. "Spleen deficiency and phlegm dampness" is one of the key pathogenesis of lung cancer [19].

Erchen decoction is mainly combined with NP chemotherapy in the treatment of non-small cell lung cancer. NP chemotherapy is effective in the treatment of non-small cell lung cancer and has important value in improving the patient's condition, but patients are prone to gastrointestinal reactions, leukopenia, and other toxic side effects. Erchen decoction is often used as an adjunct to Western medicine chemotherapy. Li Jing [20] observed 78 cases of non-small cell lung cancer patients with phlegm dampness syndrome diagnosed by traditional Chinese medicine. The results showed that the clinical efficacy, adverse reactions, QLQ-C30, and KPS scores of Erchen decoction combined with Western medicine chemotherapy were significantly better than those of NP chemotherapy alone. More clinical observations have also confirmed this point. In patients with advanced non-small cell lung cancer, spleen dysfunction, Lung Qi failure, dampness phlegm stagnation, and other diseases are the most common. Xie Guoqun [21] observed the syndrome differentiation treatment of non-small cell lung cancer patients with phlegm syndrome by Erchen decoction combined with NP chemotherapy and found that the clinical efficacy of the combination was significantly better than that of chemotherapy alone, and the incidence of nausea and vomiting decreased white blood cell count and decreased platelet count was significantly decreased when the combination was used. At the same time, the mechanism research also has some findings. Li Yaling [22] found that the treatment of lung cancer with Erchen decoction may be related to the endoplasmic reticulum stress caused by the upregulation of ATF4 and chop proteins. Zhang Hong [23] observed 60 patients with non-small cell lung cancer and found that Erchen decoction can significantly reduce the level of IL-17, and the combination with platinum can also reduce the expression of IL-10 and increase the expression of IL-2.

Erchen decoction has a significant adjuvant effect on non-small cell lung cancer, which has gradually become the consensus of chemotherapy combined with drugs. Erchen decoction not only has a certain therapeutic effect on non-small cell lung cancer but also can significantly reduce the toxic and side effects of chemotherapy and improve the quality of life of patients.

3.3. Chronic bronchitis

Chronic bronchitis, characterized by repeated cough, expectoration, or wheezing, is a common chronic inflammatory disease of the respiratory system, mostly in the elderly ADDIN. Chronic bronchitis has the characteristics of long onset time and repeated lingering disease. Patients are accompanied by cough, phlegm, and other symptoms all year round. With the aggravation of the disease, it is also easy to induce complications such as emphysema, pulmonary heart disease, and pulmonary hypertension, which seriously affects the quality of daily life and life safety of patients [24]. In traditional Chinese medicine, chronic bronchitis is classified as "cough", "asthma syndrome" and other categories. The disease is prone to repeated attacks, often with lung, spleen, kidney deficiency, phlegm, and lung as the pathogenesis. It conforms to the clinical application scope of Erchen decoction.

Cui Xiying [25] observed the clinical effect of 126 patients with acute attacks of chronic bronchitis. The results showed that the disappearance time of cough, fever, pulmonary rales, and wheezing was significantly shorter than that of conventional Western medicine combined with Erchen decoction. Liu Shihua [26] observed the clinical effect of traditional Western medicine combined with Erchen decoction and Sanzi Yangqin Decoction in the treatment of chronic bronchitis and found that the levels of lung function index (FEV1, fev1/FEC), exercise tolerance (6MWT), SaO2 and PaO2 in the combination of traditional Chinese and Western medicine were significantly higher than those in the conventional western medicine treatment. In addition to conventional oral Chinese medicine, Yuan Qi [27] used Erchen decoction atomization inhalation based on conventional Western medicine treatment, which showed that

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Erchen decoction atomization inhalation could significantly reduce the airway inflammatory reaction of patients and improve the immune function and lung function of patients. Chronic bronchitis is characterized by airway mucus hypersecretion. Shang Lizhi [28] found that the regulatory effect of Erchen decoction on airway mucus hypersecretion in chronic bronchitis may be related to the inhibition of MUC5AC and the upregulation of AQP5 protein expression.

The clinical treatment of chronic bronchitis is difficult and difficult to cure. Modern medicine mainly uses anti-infective drugs to control the acute attack of chronic bronchitis. There are many TCM syndrome types of chronic bronchitis. Erchen decoction is a commonly used prescription for the treatment of chronic bronchitis [29], which has good clinical efficacy.

3.4. Pneumonia

Pneumonia refers to the inflammation of terminal airways, alveoli, and lung interstitium, which can be caused by pathogenic microorganisms, physical and chemical factors, immune injury, allergy, and drugs. Because children and the elderly have low immunity and are more prone to disease, the clinical research of Erchen decoction on pneumonia in the past five years is mainly in children and elderly patients. This disease is characterized by a deficiency of the lung and spleen, and more pathological products such as latent phlegm, blood stasis, and qi stagnation.

The incidence of pneumonia is often associated with external causes, and the clinical application of Erchen decoction should carefully grasp the etiology and pathogenesis of the syndrome. Wu Xiaomei [30] studied the modified Erchen decoction in the treatment of community-acquired pneumonia in the elderly and found that when combined with Erchen decoction, cough, sputum volume, mental state, appetite, activity ability, etc. were better than those treated with western medicine alone, and could shorten the length of hospital stay. Yu Jianle [31] found that Erchen decoction can also improve lung function, blood gas indicators, and sleep quality in elderly patients with pneumonia. For the treatment of pediatric pneumonia, Zheng Mingwang [32] used Erchen decoction to treat pediatric pneumonia patients to carry out clinical observation. The experimental study showed that the modified Erchen decoction could shorten the improvement time of pulmonary rales, cough, fever, and other symptoms, and reduce the incidence of adverse reactions.

3.5. Bronchial asthma

Bronchial asthma is a heterogeneous disease characterized by chronic inflammation of the airways and airway hyperresponsiveness. It is similar to "wheezing" in traditional Chinese medicine. The disease is caused by a variety of triggers to internal phlegm, resulting in phlegm obstruction of the airway, upward reversal of lung qi, and airway spasm. Phlegm is the "root of the disease", which is more consistent with the method of Erchen decoction.

Chen Minhua [33] observed 73 patients with chronic asthma duration, the control group was treated with oral montelukast sodium, the treatment group was treated with Chai Citrus Erchen decoction on this basis, and the two groups were treated for 4 weeks, and the follow-up for 1 month showed that the improvement of asthma symptom control score, TCM syndrome score, and maximum expiratory flow rate of lung function in the treatment group was better than that of the control group after treatment, at follow-up. Li Zhuying [34] conducted a systematic review of the efficacy and adverse reactions of Erchendec combined with Western medicine in the treatment of bronchial asthma, and the results showed that Erchentang had a certain role in improving the treatment effect, improving lung function, and reducing cough syndrome scores in asthma patients. Hu Songqi [35] observed 88 patients with ACOS and found that the addition and subtraction of Sanzi Yangqin Tang and Erchen Tang based on conventional treatment of Western medicine had a better effect, which could effectively improve lung function, alleviate inflammation, and promote recovery.

3.6. Cough variant asthma

Cough variant asthma (CVA) is a special type of asthma, and cough is the only or main clinical manifestation, with 30.0%~35.7% of patients with CVA evolving into typical asthma within 5 years [36]. CVA belongs to the categories of "cough", "wheezing syndrome" and "asthma syndrome" in traditional Chinese medicine. The key pathogenesis of CVA is the loss of the middle coke and the upper reversal of the lungs, which should be treated with the harmony of the lungs and stomach, and the expectorant drink.

Wan Jun [37] observed 116 children with CVA for 6 weeks of treatment and 24 weeks of follow-up

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and found that the addition and subtraction of Erchen Tang and Sanzi Yangqin Tang in the treatment of CVA children could further control cough symptoms, shorten the course of cough, improve the quality of life, reduce airway inflammation and AHR, reduce the recurrence rate, and the clinical efficacy was better than that of montelukast alone, and it was safe and had good clinical value. Guo Jin [38] used Erchen Tang Jiawei to treat patients with CVA, and the results showed that it could improve lung function, reduce airway hyperresponsiveness, and significantly reduce the recurrence rate.

3.7. Post-infection cough

Post-infection cough is referred to as post-infection cough when the symptoms of the acute phase of respiratory tract infection disappear and persist for 3~8 weeks, and there is no obvious abnormality on the chest x-ray. Post-infection cough is self-limited, but the cough lasts for a long time, which affects the quality of life of patients. Traditional Chinese medicine classifies post-infection cough as a "prolonged cough" and "stubborn cough". Post-infection cough is often treated with "wind" and "phlegm", and contemporary Chinese medicine treatment of post-infection cough mostly starts from the lungs, spleen, and stomach, and Erchen Tang is often used as the basic prescription [39]. Li Ruiting [40] observed and compared 152 children with post-infection cough with Sangxing Erchen decoction and montelukast sodium after 1 week of treatment, and found that the clinical efficacy of Sangxing Erchen decoction in the treatment of post-infection cough in children was significantly better than that of montelukast sodium, and there were no adverse reactions, which could shorten the course of some children with post-infection cough.

4. Summary and outlook

To sum up, respiratory diseases are often treated with the inability of the lungs to disperse fluid, and the inability of the spleen to transport subtleties, resulting in the accumulation of water and fluid and the production of phlegm. Erchen decoction has the effect of drying dampness and dissolving phlegm, regulating qi and neutralizing, and has a good effect on relieving the clinical symptoms of respiratory diseases such as cough, phlegm, and shortness of breath. Mechanism studies have shown that Erchen decoction can regulate inflammatory factors and regulate immunity, and can have a positive effect on multiple targets and pathways.

Erchen decoction, as a classic formula, is now mostly used as a basic formula in clinical use, so the author includes Erchen decoction in addition and subtraction and the combination of Erchen decoction in the study. However, the basic research on Erchentang is still not deep enough, and the research is only limited to a certain target or a single signaling pathway, and cannot start from the whole, but from the relationship between multiple targets and multiple pathways. Therefore, it is necessary to strengthen multi-party cooperation, expand the sample size of the study, discuss with multiple parties, and establish a complete research plan to provide strong evidence for the treatment of respiratory diseases by Erchentang.

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