

# *Research Progress on Traditional Chinese Medicine in the Treatment of Chronic Heart Failure*

Dan Qi<sup>1,a</sup>, Jing Ma<sup>2,b\*</sup>

<sup>1</sup>*Shaanxi University of Chinese Medicine, Xianyang 712046, Shaanxi, China*

<sup>2</sup>*Department of Traditional Chinese Medicine, Xijing Hospital Affiliated to Air Force Medical University, Xi'an 710032, Shaanxi, China*

<sup>a</sup>*1747881515@qq.com*, <sup>b</sup>*jingma@fmmu.edu.cn*

*\*corresponding author*

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**Abstract:** Chronic heart failure is a common clinical disease, the final destination of various heart diseases, and one of the main causes of death in patients with cardiovascular disease, which has become a major disease threatening human life and health. Epidemiological investigations show that its 5-year survival rate is comparable to that of malignant tumors. Its incidence is increasing year by year and tends to be younger, which has become an important issue in the cardiovascular field. Therefore, it has become an important task for clinicians to actively treat chronic heart failure, improve patients' clinical symptoms, and reduce the re-hospitalization and death rates. In recent years, clinical trials have shown that TCM combined with conventional western drugs can significantly improve the clinical efficacy of chronic heart failure, improve patients' cardiac function and prolong life. The treatment of chronic heart failure with TCM has the advantages of overall regulation, diagnosis and treatment, and fewer adverse reactions, etc. Its clinical efficacy has been well received by clinicians. Its clinical efficacy has been recognized by the majority of patients and has become a hot spot of clinical research. Based on the literature reports in recent years, the article summarizes the research progress of Chinese medicine in the treatment of chronic heart failure to provide a better reference for the treatment of chronic heart failure by Chinese medicine.

## 1. Introduction

Chronic heart failure refers to heart failure caused by various reasons such as hypertension, coronary heart disease, cardiomyopathy, etc., with left heart, right heart or total heart insufficiency as the main manifestation, which is the end stage of heart disease. The 2021 edition of China's Cardiovascular Health and Disease Report [1] points out that the number of people who are

currently suffering from heart failure in China is 8.9 million. A data involving 22,158 participants from 31 provinces showed that the prevalence of heart failure among people aged  $\geq 35$  years was 1.3%, an increase of 0.4% compared with the previous period, and its morbidity and mortality rate can reach 15% to 50%, which has become one of the major chronic diseases in China [2]. The pathogenesis of heart failure is complex, and it is currently believed to be related to myocardial remodeling caused by abnormal neurohumoral regulation, inflammatory mediator release, apoptosis and autophagy, oxidative stress, impaired energy metabolism, etc. Clinical treatments are focused on improving the patient's symptoms, improving the quality of life, and decreasing the rate of re-hospitalization and mortality. Western medicine mostly adopts cardiotonic, diuretic and vasodilator drugs, and the commonly used drugs include angiotensin-converting enzyme inhibitors,  $\beta$ -blockers, aldosterone receptor antagonists and so on. With the progress of modern medicine, in recent years, new drugs such as sodium-glucose co-transporter protein-2 (SGLT-2) inhibitors and sacubitril valsartan (ARNI) have appeared one after another, and ARNI can attenuate oxidative stress and inflammatory response, reduce cardiomyocyte apoptosis, inhibit ventricular remodeling, and improve clinical symptoms, and it has become a guideline-recommended first-line drug for the treatment of heart failure. SGLT-2 inhibitors can improve myocardial energy metabolism, reduce cardiac anterior and posterior loads, and inhibit ventricular remodeling while lowering glucose, which has obvious anti-heart failure effects. Currently, significant progress has been made in heart failure-related research, with significant improvement in patient prognosis and reduction in cardiovascular mortality, but the efficacy is limited and does not fully meet the therapeutic needs. With the advantages of multi-component, multi-pathway and multi-target, TCM treatment can significantly improve clinical symptoms and quality of life of patients with chronic heart failure and reduce re-hospitalization. The relevant studies on TCM treatment of chronic heart failure are now organized and analyzed.

## 2. Etiology

The etiology of heart failure is relatively complex, whether it is a disease of the heart itself or a disease of other internal organs can lead to the occurrence of heart failure. The causes of heart failure in Chinese medicine are categorized into three types: internal, external and non-internal causes. Combined with the relevant literature analysis, for the understanding of the etiology of heart failure, the opinions of various medical doctors basically converge, and the main causes are summarized as the invasion of external evils, dietary impurity, emotional and emotional injuries, and excessive fatigue. In addition, it is also related to women's post-pregnancy and post-partum body weakness, disease mismanagement and misdiagnosis, dysfunction of internal organs, congenital deficiency of essence, qi and blood, and old age and frailty. For the chronic heart failure pathogenesis and understanding, modern medical doctors basically tend to agree, mostly summarized as this deficiency. Qi deficiency and blood stasis, but there are also different insights and thinking, and recognition is higher. According to Prof. Li Xiangzhong, the disease mechanism of this disease is the deficiency of this standard, with the deficiency of yang, yin and qi as the standard, and the blood stasis and water-drinking internal stagnation as the standard, with the mixture of deficiencies and realities, and the standard and the root of the disease. Professor Wu Rongzu, from the theory of "yang deficiency and yin evil", proposed that the heart and kidneys belong to the Shaoyin meridian, and yang deficiency of the heart and kidneys is the essence of the heart and kidneys, and the maintenance of life activities can not be separated from the heart and kidneys, yang warmth and promotion, and the production of phlegm and dampness, water and blood stasis and other pathological products of yin evils, which in turn aggravate the heart and kidneys, yang deficiency and decline [3]. Zhang Junfang et al [4] summarized the main pathomechanisms of

chronic heart failure as qi and yang deficiency, luoyu stasis and water stagnation, and luoyu interest and accumulation, in which the root cause of the disease is qi and yang deficiency, and the interactions among qi, blood, and water lead to the occurrence of the disease. A correct understanding of the etiology of heart failure has an important role in clinical treatment.

### 3. Identification and typing

In recent years, the diagnostic typing of heart failure has been developed and updated. The 12th Five-Year Plan textbook of Chinese medicine is divided into four types: qi deficiency and blood stasis, qi and yin deficiency, yang deficiency and water flooding, and phlegm and drink obstruction of the lungs, while the 13th Five-Year Plan textbook replaces phlegm and drink obstruction of the lungs with asthenopia crisis, which is the most common type of heart failure. The characterization of heart failure has been evolving, and the characterization of patients with heart failure varies in different regions. In a retrospective analysis of 632 patients with heart failure, Feng Yuming et al.[5] found that the most common syndromes in heart failure patients in the Lingnan region were cardiac and renal yang deficiency and qi deficiency and blood stasis. Wu Han et al [6] analyzed the heart failure points and Chinese medicine patterns of a total of 324 heart failure patients in two hospitals in Pudong New Area, Shanghai, China, and found that patients with Yang deficiency and water flooding patterns had the highest heart failure points, followed by phlegm congestion pattern, cardiac and blood stasis pattern, qi and blood stasis pattern and qi and yin deficiency pattern. Shi Gang et al [7] analyzed the correlation between Chinese medicine patterns and B-type natriuretic peptide (BNP) in 822 patients with chronic heart failure and found that the patients' Chinese medicine patterns were highest in the cardiopulmonary qi deficiency pattern, followed by cardiorenal and renal yang deficiency pattern, whereas the BNP levels, from high to low, were in the following order: water-drinking overriding the heart pattern, cardiorenal and renal yang deficiency pattern, qi deficiency with blood stasis, qi yin and yin double deficiency pattern, and cardiopulmonary qi deficiency pattern. Li Xingxing et al [8] analyzed the Chinese medicine evidence type and left ventricular ejection fraction of 971 patients and found that there was a correlation between left ventricular ejection fraction (LVEF) and Chinese medicine evidence type, and that LVEF was the lowest in the yang-deficiency and water flooding evidence. Zhao Yongjia et al [9] analyzed the TCM patterns of 200 patients with heart failure and found that patients with heart failure combined with atrial fibrillation had the main patterns of qi deficiency and blood stasis and qi and yin deficiency, and that a history of hypertension, low-density lipoprotein cholesterol (LDL-C), and hemoglobin (Hb) were associated with qi deficiency and blood stasis, whereas creatinine (Cr) and blood uric acid (UA) may be risk factors for qi and yin deficiency. Zhang Weili et al [10] analyzed the cardiac function grading and evidence pattern of 422 patients with heart failure, suggesting that cardiac function grades I-IV corresponded to qi deficiency and blood stasis evidence, qi and yin deficiency evidence, phlegm and drink obstruction of the lungs evidence, and yang deficiency and water stoppage evidence, respectively. Zhao Meiyong et al [11] collected the tongue, pulse and moss of 215 patients with chronic heart failure and found that heart failure was dominated by Yang deficiency and water flooding syndrome, Yang deficiency and blood stasis and water stopping syndrome, Qi deficiency and blood stasis syndrome, Qi and yin deficiency syndrome, and phlegm and drink obstructing the lungs syndrome, after performing the evidence type analysis. The synthesis of the above studies shows that the identification of heart failure disease is mostly a composite evidence, and the highest frequency of single-evidence factors among the many composite evidence is Yang deficiency, Qi deficiency and water-stopping evidence.

## 4. Mechanism of action of Chinese medicine in treating heart failure

Chinese medicine has the advantages of multi-targets and multi-pathways in the treatment of chronic heart failure, and the research on its mechanism of action is also carried out in multiple directions and from multiple perspectives.

### 4.1 Regulation of mitochondrial function and energy metabolism

Li Yan et al [12] found that *Astragalus scapularis hebecarpa* pairs could increase the protein expression of Mfn1, Mfn2 and OPA1 in myocardial tissues of rats with heart failure, and decrease the protein expression of Drp1 and Fis1, suggesting that *Astragalus scapularis hebecarpa* could regulate the mitochondrial dynamics of myocardial tissues, thus exerting its therapeutic effect on heart failure. Lv Xueqi et al [13] analyzed that *Astragalus scapularis* can down-regulate eight metabolites including carnitine, glutamine, creatine, proline, homocitrulline, lactic acid, taurine and alanine in the heart tissues of rats with HF by metabolomics method, and combined with the network pharmacological research, they found that *Astragalus scapularis* can widely regulate energy metabolism, including metabolism processes of glucose, lipids, ATP and proteins, among which, it mainly regulated the glucose-lipid metabolism.

### 4.2 Regulation of humoral-hormonal signaling

An Yi-Pei et al [14] analyzed the mechanism of Danshen and Chuanxiong in the treatment of heart failure by using network pharmacology methods, and screened 33 active ingredients such as tanshinone IIA and dihydrotanshinolide, etc. Using molecular docking technology methods, it was found that tanshinone IIA had a stable binding ability with the target protein NR3C1, which may regulate DNA/RNA transcription, humoral-hormonal signaling and myocardial contraction through multiple signaling pathways. myocardial contraction.

### 4.3 Inhibition of apoptosis

Wen Yang Zhen Failure Granules can increase the serum exosomal miR-21, myocardial miR-21mRNA, and reduce the level of p38MAPK and p-p38MAPKmRNA and protein in heart failure rats, and analyze the mechanism of its treatment of heart failure may be related to the up-regulation of the exosomal miR-21 and the inhibition of the activity of the p38MAPK signaling pathway. Ke Shuangqiao et al [15] found that *Astragalus* injection could reduce the apoptosis rate, ATP content, calcium content, and Mfn2 and GRP75 mRNA expression level of H9c2 myocardial apoptotic cells, reduce the reduction of VDAC1, Mfn2, and GRP75 protein expression level, and increase the expression level of VDAC1 mRNA, so as to analyze that the mechanism of *Astragalus* injection for the treatment of chronic heart failure is to improve the cardiomyocyte energy metabolism and mitochondrial calcium ion transport, and inhibit cardiomyocyte apoptosis.

### 4.4 Promote vascularization

Cui Liangyu et al [16] found that astragaloside increased VEGF and CD31 expression and down-regulated vWF, TNF- $\alpha$  and IL-6 protein expression, and its effect was positively correlated with the dose. Lu Wenjiang et al. found that Lixin Chongzhi (*motherwort*, *Drabanemerosa hebecarpa*, tonic acid, *huangjing* and *astragalus*) increased neovascularization, elevated myocardial SIRT3, PFKFB3, and HIF-1 $\alpha$  proteins, and activated the SIRT3/PFKFB3/HIF-1 $\alpha$  signaling pathway, and the effect was positively correlated with the dose.

#### 4.5 Antihistone acetylation

Yang Ying et al [17] used minimally invasive transverse aortic narrowing surgery to construct a mouse model of heart failure and found that chuanxiongine increased the levels of GATA4 and Mef2c near the Atp2a2 promoter region, suggesting that chuanxiongine may improve cardiac function by upregulating SERCA2a through histone acetylation modification.

### 5. Drug therapy

In recent years, the advantages of combining Chinese and Western medicine have become more and more obvious in the treatment of chronic heart failure. The main modalities of Chinese medicine in the treatment of chronic heart failure include traditional Chinese medicine soup, proprietary Chinese medicine, and traditional Chinese medicine injection. Among them, TCM tonics for chronic heart failure have been studied the most in the clinic, but the quality of the literature is relatively average, and further clinical evaluation of long-term efficacy is needed. Traditional Chinese medicine injection has achieved better efficacy in improving patients' cardiac function, reducing morbidity and mortality, and improving clinical symptoms, etc. The number of literature reports on traditional Chinese medicine injection is small, but the quality and level of literature is high.

#### 5.1 Single-flavored Chinese medicine

Zheng Yongzhi et al [18] analyzed the medical cases of the 1st to 3rd batch of national medical masters and the first batch of famous Chinese medicine practitioners' academic experience workers and instructors, and found that in the diagnosis and treatment of heart failure, the top 5 Chinese medicines in order of frequency of use were *Poria cocos*, *epiphyllum*, *Atractylodes macrocephala*, *Astragali*, and cinnamon sticks, and the three types of medicines with the highest frequency were tonic medicines, medicines that activate blood circulation and remove blood stasis, and medicines that promote drainage and seepage of dampness, respectively. Awaguli-Daguti et al [19] found through data mining that the single drugs with the highest frequency of occurrence in the herbal compound prescriptions for the treatment of heart failure were danshen, scapularia, astragalus, cinnamon twig and poria, respectively.

##### 5.1.1 Astragalus

Liu Lili et al[20] found that *Astragali* polysaccharide could increase LVEF, left ventricular short-axis shortening (LVFS), ATP content of myocardial tissues, reduce left ventricular end-diastolic internal diameter (LVEDD), left ventricular end-systolic internal diameter (LVESD), attenuate the morphological and structural damage of cardiomyocytes, and make myocardial transverse striations clearer in rats with chronic heart failure. Cui Liangyu et al [21] used different doses of astragaloside to act on heart failure with preserved ejection fraction (HFpEF) rats, and found that astragaloside increased LVEF and decreased NT-ProBNP.

##### 5.1.2 *Drabanemerosa hebecarpa*

Li Yan et al[22] used different doses of *Astragalus scapularis* granules to act on heart failure rats and observed that both high dose *Astragalus scapularis* group and trimetazidine group could improve the mitochondrial structure of cardiomyocytes in heart failure rats with comparable effect and *Astragalus scapularis* drug showed dose-dependence on the efficacy. Dong Zhuqin et al[23]

different concentrations of the aqueous extract of *South Drabanemerosa hebecarpa* can reduce the left ventricular posterior wall thickness (LVPWd), left ventricular end-diastolic pressure (LVEDP) and left ventricular end-systolic pressure (LVESP) and increase LVEF, FS, which can make the number of cardiomyocyte apoptosis significantly reduced, while there is no significant difference in the effect of different concentrations.

### 5.1.3 Ginseng

Chen Donglang et al. [24] conducted a randomized controlled trial in 60 patients with heart failure, in which the observation group took ginseng 15g per day, and after 14 days of treatment, their LVEDD, LVESD, HR, and NT-pro BNP decreased significantly compared with those of the control group, which suggests that ginseng has a significant therapeutic efficacy in the treatment of heart failure. Zhang Wei et al. [25] analyzed the targets and possible pathways of ginseng in the treatment of heart failure by using network pharmacological methods, and the results suggest that 22 active ingredients of ginseng may act on 50 targets in chronic heart failure, and their mechanisms are related to anti-inflammation and anti-apoptosis.

### 5.1.4 Epiphyllum

Gangmin Li et al [26] used the total alkaloids of *Epiphyllum officinale*, water-soluble alkaloids of *Epiphyllum officinale*, and essential polysaccharides of *Epiphyllum officinale* to act on an isolated rat model of failing heart, and found that the different fractions of *Epiphyllum officinale* could reduce the heart rate of the failing heart, lower the levels of CK-MB, cTn-T, and Ca<sup>2+</sup>, and elevate the LV systolic pressure, and the cardiac systolic and diastolic durations. Yu Wuhua et al [27] found that both yin and yang epiphyllum could increase LVSP and LVEDP in rats with chronic heart failure, while yin epiphyllum improved diastolic function in female rats and yang epiphyllum improved systolic function in male rats.

### 5.1.5 Salvia divinorum

Bai Dongyang et al [28] acted on heart failure rats with different doses of *Salvia divinorum* extract, which could significantly increase the levels of HR, LVSP, SAP, and MAP, and upregulate the expression of p53, p-ERK, and p-JNK proteins, and the effect of the medium dose was the most significant. Gong Xue [29] found that tanshin freeze-dried powder could reduce hs-CRP, IL-6, BNP levels and enhance LVEF in heart failure patients. Song Yuanyuan et al [30] observed that tanshinone IIA could reduce BNP levels, Ang II, LVM, LVMI, myocardial tissue Col I, Col III, p-PI3K, p-Akt protein content, myocardial collagen Volume ratio.

## 5.2 Traditional Chinese Medicine Soup

Chinese medicine soup is a traditional Chinese medicine dosage form with a long history and good clinical efficacy, and it has been studied the most in the clinic. Chinese medicine focuses on the idea of "overall regulation, identification and treatment", so modern medical doctors have also studied chronic heart failure according to different types of evidence in the treatment of chronic heart failure.

### 5.2.1 Wen Yang and Li Shui Method

Some medical doctors believe that the treatment of chronic heart failure is mainly based on

warming yang and inducing water. Gong Ping et al [31] included 14 related literatures to conduct Meta-analysis on the efficacy of Ling Gui Jiu Gan Tang combined with Ginseng and Ginseng Soup in the treatment of chronic heart failure, and the results showed that Ling Gui Jiu Gan Tang combined with Ginseng and Ginseng Soup had obvious effects in improving the left ventricular ejection fraction and decreasing the level of serum amino-terminal cerebral natriuretic peptide precursor. Liu Fang et al [32] took 100 cases of chronic heart failure patients as research subjects and found that the study group had significant efficacy in improving cardiac function, which is worthy of clinical promotion.

### **5.2.2 Method of benefiting qi and activating blood circulation**

Benefiting qi and activating blood has also played a significant role in the treatment of heart failure. Zhou Aimin et al [33] used Baoyuan Tang combined with Blood House and Blood Stasis Tang to treat chronic heart failure with qi deficiency and blood stasis, and observed its effects on patients' clinical symptoms, Chinese medicine symptoms, plasma NT-proBNP and inflammatory factors, and the results showed that the observation group was better than the control group, and that the observation group had a significant advantage over the control group in using modern medical treatment alone.

### **5.2.3 Method of benefiting qi and nourishing yin**

Zheng Meihua [34] concluded after clinical use of the drug that the efficacy of Shengwei San in the treatment of chronic heart failure with qi and yin deficiency was certain, the improvement of cardiac function of patients was more obvious, and the total effective rate was higher. Li Wenxi et al [35] included 105 cases of heart failure patients with qi and yin deficiency, and the treatment group added Yiqi and yin formula on the basis of the control group, and found that the clinical effect of the treatment group was better. This shows that benefiting qi and nourishing yin is also an important treatment for heart failure.

### **5.2.4 Method of replenishing qi and unblocking veins**

Qi deficiency and blood stasis is an important pathomechanism of chronic heart failure, and some medical practitioners have established the treatment method of replenishing qi and clearing collaterals according to this pathomechanism. For example, Zhang Qian [36] included 92 cases of coronary artery atherosclerotic heart disease chronic heart failure patients as research subjects, the control group using conventional Western medicine treatment, the observation group in the control group on the basis of the addition of tonifying qi and smooth collaterals soup treatment, found that the observation group of traditional Chinese medicine evidence points, the level of the left ventricular end-diastolic internal diameter decreased more significantly, the level of cardiac output, the left ventricular ejection fraction increased more significantly. Jiang Xue et al. [37] treated 53 patients with chronic heart failure in coronary atherosclerotic heart disease with Qi replenishment and smooth complex formula, and found that Qi replenishment and smooth complex formula could improve the patients' cardiac function, reduce the Chinese medicine symptom score and inflammatory reaction.

## **6. Non-pharmacological treatment**

Wu Fengzhu et al [38] observed the therapeutic effect of acupuncture Neiguan in 60 patients with chronic heart failure, and found that on the basis of western medical treatment, acupuncture

Neiguan can effectively relieve heart failure symptoms, such as palpitations, chest tightness, shortness of breath, etc., and is superior to pure western medical treatment in improving cardiac function and improving quality of life. Huang Huojian et al [39] used western medicine standardized treatment plus traditional Chinese medicine sealing package to assist in the treatment of heart failure patients with cardiopulmonary two-deficiency syndrome, after treatment, the Chinese medicine evidence points and ventricular remodeling indexes of patients in the treatment group improved significantly. Yang Yan et al [40] found that thunder fire moxibustion treatment (six acupoints: Shaoshang, Yinbai, Zhiyang, Lingtai, Shendao, and Zhimen) for patients with heart failure could significantly improve the patients' clinical symptoms, improve the left ventricular ejection fraction, and reduce the BNP value.

## 7. Summary

The clinical efficacy of Chinese medicine in treating heart failure is precise and safe, and the synergistic effect of combining with western medicine benefits patients. However, there are some problems: (1) Clinical studies are mostly based on the principle of randomized control, ignoring blinding, with small sample sizes, fewer reports of adverse reactions, short follow-up time, and lack of observation of long-term endpoint events, which affects the reliability of trial results. (2) There is a lack of uniform standards for the identification and typing of heart failure in Chinese medicine, and the clinical identification is subject to certain subjectivity and ambiguity due to the influence of medical experience, which is not conducive to the development of clinical diagnosis and treatment and scientific research. (3) The lack of core outcome indicators in clinical efficacy evaluation affects the reuse of similar data and is not conducive to the improvement of evidence-based medical support. (4) There are more studies on clinical observation and fewer studies on mechanism of action of TCM intervention in heart failure, and there is a lack of systematic elaboration on the targets of action and related mechanisms of TCM. Overall, the efficacy of TCM in the treatment of heart failure is remarkable, and it has been widely used in clinical practice, becoming a new direction in the prevention and treatment of heart failure.

## References

- [1](The Writing Committee of the Report on Cardiovascular Health and Diseases in China).*Report on Cardiovascular Health and Diseases in China 2021:an Updated Summary. Chinese Circulation Journal*,2022,37(6):553-578.
- [2]GUO Mengyang, WANG Shoufu, XING Dongmei. *Research progress of traditional Chinese medicine in the treatment of heart failure. Chinese Journal of Integrative Medicine on Cardio-Cerebrovascular Disease*,2024,22(1):92-95.
- [3]YANG Haiyan, JIN Yanrong, DING Zhe, et al.*Theoretical analysis of WU Rong-zu's warming and strengthening Shaoyin in the treatment of chronic heart failure. China Journal of Traditional Chinese Medicine and Pharmacy*,2017,32(3):1098-1100.
- [4]XU Mengqi, WANG Qiang. *A review on the TCM treatment of chronic heart failure. Clinical Journal Of Chinese Medicine*,2023 15(36):65-68.
- [5]FENG Yuming, LI Sining. *The Relationship between TCM Syndromes and Onset Solar Terms in Patients with Heart Failure in Lingnan. Chinese Journal of Integrative Medicine on Cardio-Cerebrovascular Disease*,2021,19(22):3927-3930.
- [6]WU Han, LI Ping, WU Yan-ting, et al. *Application of heart failure score in the relationship between TCM syndrome and heart function classification. Journal of Tongji University(Medical Science)*,2021,42(4):472-477.



- [7]SHI Gang, ZHU Lin, ZHANG Yao, et al. Correlation between the distribution of traditional Chinese medicine syndromes and brain natriuretic peptide in chronic heart failure. *China Practical Medicine*,2021,16(26):161-163.
- [8]LI Xingxing, WU Yang, FAN Zongjing, et al. Meta-analysis of correlation between TCM syndromes and left ventricular ejection fraction in chronic heart failure. *China Medical Herald*,2019,16(21):143-146, 150.
- [9]ZHAO Yongjia, LIU Pan, DAI Xiaohua. Analysis of the distribution pattern of Chinese medicine symptoms and risk factors in patients with chronic heart failure combined with atrial fibrillation. *Chinese Journal of Integrative Medicine on Cardio-Cerebrovascular Disease*,202220(8):1453-1456.
- [10]ZHANG Wei-Li, GAO Chen, LI Jie,et al. Relationship between Chinese medicine evidence and cardiac function grading in chronic heart failure. *Chinese Journal of Integrative Medicine on Cardio-Cerebrovascular Disease*,2021,19(21):3765-3767.
- [11]ZHAO Meiyong, LIU Pan, YUAN Liang, et al. Association and Cluster Analysis of Syndrome, Symptom, Tongue, Pulse, and Moss in 215 Patients with Heart Failure. *Chinese Journal of Integrative Medicine on Cardio-Cerebrovascular Disease*,2021,19(9):1464-1468.
- [12]LI Yan, LIU Yang, SHI Xiaoyu, et al. Effects of medicine on mitochondrial dynamics of myocardial tissue from *Astragalus scapularis* on rats with heart failure. *Lishizhen Medicine and Materia Medica Research*,2021,32(3):520-523.
- [13]Lü Xue-qi, GUO Cong-cong, XU Yue,et al. A proposed mechanism by which Qishen Yiqi dropping pill improves cardiac energy metabolism in rats with heart failure based on metabolomics and network pharmacology. *Acta Pharmaceutica Sinica*,2022,57(5):1387-1395.
- [14]AN Yipei, CHEN Peng, CHEN Yan,et al. Discussion on Mechanism of Guanxinling Tablets for Heart Failure Based on Network Pharmacology and Molecular Docking. *New Chinese Medicine*,2022,54(12):9-15.
- [15]KE Shuang-Qiao, ZHANG Ting, PANG Rui-Ming. Effect of *Astragalus* Injection on Angiotensin II-Induced H9c2 Myocardial Apoptosis and Its Mechanism. *Journal of Guangzhou University of Traditional Chinese Medicine*,2022,39(4):914-919.
- [16]Cui Liangyu, Ma Jing, Zhang Xuexue,et al. *Astragaloside IV*Protects Cardiac Function in Rats with Congestive Heart Failure with Preserved Ejection Fraction and Its Influence on Myocardial Microvascular Inflammatory Factors. *Journal of Emergency in Traditional Chinese Medicine*,2022,31(1):53-57.
- [17]YANG Ying, ZHANG Wen-hua, DING Ming,et al. Research on Prevention and Control Mechanism of the Ligustrazine Up Regulates SERCA2a by Regulating Histone Acetylation in A Mouse Model of Heart Failure. *Journal of Modern Laboratory Medicine*,2021,36(6):34-40.
- [18]ZHENG Yong-zhi, WANG Yan, YAO Cheng-zeng,et al. Research on Medication Regularity of Heart Failure by Masters of Traditional Chinese Medicine and National Famous Chinese Physicians. *Guiding Journal of Traditional Chinese Medicine and Pharmacy*,2020,26(14):152-155.
- [19]Awaguli Dawuti, Ren Liwen, Wang Ranran, et al. Network Pharmacology Study of the Effective components of Traditional Chinese Medicine in the Treatment of Heart Failure. *Pharmacology and Clinics of Chinese Materia Medica*,2020,36(5):131-136.
- [20]LIU Lili, WANG Guoliang. Effects of *Astragalus* Polysaccharides on the Energy Metabolism of Cardiomyocytes in Rats with Chronic Heart Failure. *Chinese Journal of Integrative Medicine on Cardio-Cerebrovascular Disease*,2022,20(3):420-426.
- [21]Cui Liangyu, Ma Jing, Zhang Xuexue, et al. *Astragaloside IV*Protects Cardiac Function in Rats with Congestive Heart Failure with Preserved Ejection Fraction and Its Influence on

- Myocardial Microvascular Inflammatory Factors. Journal of Emergency in Traditional Chinese Medicine*,2022,31(1):53-57.
- [22]LI Yan, LIU Yang, SHI Xiaoyu, et al. *Effects of medicine on mitochondrial dynamics of myocardial tissue from Astragalus scapularis on rats with heart failure. Lishizhen Medicine and Materia Medica Research*,2021,32(3):520-523.
- [23]DONG Zhuqin, LUO Ying, YANG Ming, et al. *Intervention of different concentrations of aqueous extract from Semen Lepidii on heart function in rats with heart failure. China Modern Doctor*,2020,58(11):38-42,193.
- [24]CHEN Donglang, ZOU Peiyuan, LIN Mingjian. *A study of the effect of ginseng on cardiac function and neuroendocrine factors in patients with heart failure. China Medicine And Pharmacy*,2020,10(23):100-102,173.
- [25]ZHANG Wei, ZHANG Yan, LI Na, et al. *Explore the Mechanism of Renshen(Ginseng Radix Et Rhizoma) in the Treatment of Heart Failure Based on Network Pharmacology. Journal of Liaoning University of Traditional Chinese Medicine*,2021,23(6):102-106.
- [26]LI Gang-min, PENG Cheng, XU Xin,et al. *Cardiotonic effects of components from Lateralis Radix Praeparata on isolated rat hearts. Lishizhen Medicine and Materia Medica Research*,2021,32(2):265-268.
- [27]Yu Wuhua, Zhong Lingyun, Ye Xietao, et al. *Regulatory Effect of Yinfupian and Yangfupian on RAAS System in Rats with Chronic Heart Failure. Pharmacology and Clinics of Chinese Materia Medica*,2020,36(3):144-148.
- [28]BAI Dongyang, ZHANG Lihua. *Influences of Salvia Miltiorrhiza Extract on Cardiac Function and Myocardial Cell Apoptosis in Rats with Heart Failure. Chinese Journal of Integrative Medicine on Cardio-Cerebrovascular Disease*,2021,19(2):235-239.
- [29]Gong Xue. *Effect of lyophilized powder of Salvia miltiorrhiza on inflammatory indexes in elderly patients with heart failure. The Medical Forum*, 2020,24(26):3763-3764.
- [30]SONG Yuanyuan, SHI Pengxiao, YAN Hongjuan. *Effects of Tanshinone IIA on Ventricular Remodeling and PI3K/Akt Signaling Pathway in Rats with Heart Failure. Chinese Journal of Integrative Medicine on Cardio-Cerebrovascular Disease*,2022,20(4):638-642.
- [31]GONG Ping, XIE Yun, YAO Cheng-zeng. *A Meta Analysis of Poria and Cinnamon Twig and Atractylodes Macrocephala and Licorice Decoction Combined with Ginseng and Aconite Decoction in the Treatment of Chronic Heart Failure. Henan Traditional Chinese Medicine*,2022,42(3):337-342.
- [32]LIU Fang, HUANG Jianrong, ZHANG Guoxiong, et al. *Efficacy and effect on cardiac function of adding flavored warm-yang and water-liquid formula in the treatment of chronic heart failure. Inner Mongolia Journal of Traditional Chinese Medicine*,2021,40(10):4-5.
- [33]ZHOU Aiming, YANG Deqian, ZHAO Fenglin. *Effects of Baoyuan Decoction and Xuefu Zhuyu Decoction on cardiac function and inflammatory factors in patients with chronic heart failure. China Medical Herald*,2019,16(10):128-131.
- [34]Zheng Meihua. *Analysis of the effect of Shengweisan combined with sacubitril valsartan sodium tablets in the treatment of chronic heart failure with decreased ejection fraction in qi and yin deficiency evidence. Prevention and Treatment of Cardiovascular Disease*,2021,11(22):12-14.
- [35]LI Wenqian, YUAN Suyun, WEI Yihong, et al. *Effect of Yiqi Yangyin Decoction with Ejiao(Colla Corii Asini) on Heart Function and Quality of Life in Chronic Heart Failure Patients. Liaoning Journal of Traditional Chinese Medicine*,2021,48(3):59-61.
- [36]ZHANG Qian. *Effect analysis of Buqi Changluo Decoction in treating chronic heart failure patients with coronary heart disease. Clinical Journal Of Chinese Medicine*,2018,10(36):36-37.

- [37]JIANG Xue, LI Guo-lin. *Clinical effect of Buqi Changluo Recipe on chronic heart failure of coronary heart disease with Qi-deficiency and blood-stasis syndrome and its influence on inflammatory factors.*China Practical Medicine,2022,17(2):4-7.
- [38]WU Fengzhu, ZHANG Jiamei. *Clinical Effect of Acupuncture at Neiguan Point on Chronic Heart Failure.* Practical Journal of Cardiac Cerebral Pneumal and Vascular Disease,2020,28(8):98-104.
- [39]HUANG Huo-jian, CHEN Wu-jun, ZHUANG Hong-biao. *The Effect of Chinese Medicine Packet Adjuvant Therapy in the Treatment of Chronic Heart Failure with Heart-Lung Deficiency Syndrome and Its Influence on Myocardial Injury and Ventricular Remodeling.*Guiding Journal of Traditional Chinese Medicine and Pharmacy,2021,27(3):104-108.
- [40]YANG Yan, YANG Xin. *Effects of thunder fire moxibustion on cardiac function and immune function in elderly heart failure patients with Yang deficiency and water flooding type.*Chinese Journal of Integrative Medicine on Cardio-Cerebrovascular Disease,2022,20(7):1265-1267.