DOI: 10.53469/jcmp.2025.07(07).12

Research Progress of Sijunzi Decoction and Xiaochaihu Decoction Combined with TACE in the Treatment of Primary Liver Cancer

Chengcheng Xue[1], Haijuan Xiao[2,3,*]

[1]Shaanxi University of Chinese Medicine, Xianyang 712046, Shaanxi, China
[2]Integrated Traditional Chinese and Western Medicine Hospital of Wenzhou Medical University, Wenzhou 325000, Zhejiang, China
[3]Oncology Hospital, Affiliated Hospital of Shaanxi University of Chinese Medicine, Xianyang 712000, Shaanxi, China
**Correspondence Author*

Abstract: ***Sijunzi Decoction combined with Xiaochaihu Decoction is composed of ginseng, atractylodes, Poria cocos, licorice, bupleurum, scutellaria, etc., and has the effects of invigorating qi and strengthening the spleen, soothing the liver and relieving depression. Clinically, it is often combined with TACE for the treatment of primary liver cancer (PLC). Its active components include ginsenosides, saikosaponin D, atractylenolide, etc., which can exert anti-tumor effects in collaboration with TACE through multiple pathways. Studies have shown that this combined regimen can inhibit liver inflammatory responses, reduce the release of cytokines such as TNF-α and IL-6 after TACE, and alleviate embolization syndromes such as fever and abdominal pain; regulate the p53 and NF-κB signaling pathways to induce tumor cell apoptosis, while protecting normal hepatocytes through the PI3K/Akt pathway; activate the activity of $CD8^+$ T cells and NK cells, and reverse the immunosuppression in the tumor microenvironment. Clinical data show that it can improve the effective rate of TACE treatment, reduce the levels of ALT, AST, and AFP, shorten the duration of postoperative discomfort, and improve the KPS score of patients. This paper also points out the problems existing in current research, such as insufficient depth of basic mechanisms and the lack of RCT. In the future, through multidisciplinary collaboration and technological innovation, it is expected to construct a more efficient and individualized integrated traditional Chinese and Western medicine diagnosis and treatment system, opening up a new path for improving the prognosis of liver cancer patients.***

Keywords: Primary liver cancer, Interventional therapy, Transcatheter arterial chemoembolization, Traditional Chinese medicine**.**

1. Foreword

In 2022, the number of morbidity of primary liver cancer (Primary liver cancer, PLC) in China was 367700, ranking fourth in the number of new morbidity of various cancers (lung, colorectal, thyroid, liver), and fifth in the incidence (lung, female breast, thyroid, colorectal, liver). In 2022, the number of deaths due to primary liver cancer was 316,500, ranking second in both the number of deaths and the mortality rate (lung and liver) [1,2]. Primary liver cancer mainly includes hepatocellular carcinoma (HCC), intrahepatic cholangiocarcinoma (ICC) and combined hepatocellular - cholangiocarcinoma (cHCC-CCA), which are different in morbidity mechanism, biological behavior, histopathology, treatment and prognosis. HCC accounted for 75%~85% and ICC accounted for 10%~15% [3,4].

At present, the treatment of liver cancer mainly includes hepatectomy, liver transplantation, ablation therapy, endovascular interventional therapy, radiotherapy, systemic anti-tumor therapy, traditional Chinese medicine therapy and other means. Transcatheter arterial chemoembolization (TACE), as one of the vascular interventional therapies, is currently considered to be one of the most common non-surgical treatments for hepatocellular carcinoma [5]. Tace is the first choice for unresectable patients. It has the characteristics of small trauma and strong targeting. Embolization can block the blood supply of liver tumors, and local injection of anti-tumor drugs can control the growth of tumors, promote their necrosis and shrinkage, and improve the prognosis of patients [6].

Although TACE has a good effect on controlling and reducing the development of tumor lesions, it may lead to a variety of complications, which may be caused by ischemia and necrosis of tumor cells and some normal cells in the liver due to chemoembolization, followed by cytokine release, inflammatory response and stress response. It may also be related to various toxic and side effects of embolic agents and chemotherapy drugs used [7]. Clinically, Tace is prone to postoperative syndrome, causing fever, abdominal pain, nausea and vomiting, anorexia, fatigue and other manifestations, increasing the pain of patients, affecting the good recovery of the body [8]. Clinical data showed that only western medicine was used to treat embolism syndrome after TACE, and the clinical signs and symptoms of patients improved slowly [9].

With the continuous in-depth research on Traditional Chinese Medicine (TCM), TCM therapy has shown good clinical efficacy in prolonging the survival period of tumor patients, improving their quality of life, and reducing the incidence of tumor complications [10]. Studies have indicated that the combination of TCM and TACE can enhance therapeutic efficacy, alleviate toxic side effects, and improve patients' quality of life [11]. A clinical study showed that TACE combined with the spleen-strengthening and liver-soothing formula Si Jun Zi combined with Chai Hu Shu Gan San can enhance the therapeutic effect, improve patients' quality of life, ameliorate TCM clinical symptoms, reduce adverse reactions, and improve liver function [12].

2. Understanding of Liver Cancer in Traditional Chinese Medicine and Western Medicine

2.1 Understanding of Primary Liver Cancer and TACE in Modern Medicine

Primary liver cancer mainly includes hepatocellular carcinoma (HCC), intrahepatic cholangiocarcinoma (ICC), ICC) and combined hepatic-cholangiocarcinoma (cHCC-CCA). The mechanism of morbidity, biological behavior, histopathology, and most of the patients were complicated with hepatitis B virus infection or cirrhosis [13]. The main risk factors of liver cancer are viral hepatitis infection and cirrhosis, aflatoxin and heavy drinking, as well as the immune microenvironment in the liver [14]. The clinical signs and symptoms and signs at the beginning of primary liver cancer are often not typical, patients often can not detect their own condition in time, until the discovery, the disease has progressed to the middle and late stages, there may be palpable mass in the liver area, pain in the liver area or even radiation to the whole abdomen, abdominal distension, loss of appetite, progressive weight loss, jaundice and other major clinical signs and signs.

2.2 Understanding of Liver Cancer in TCM

Traditional Chinese medicine (TCM) does not have the specific term "liver cancer", but descriptions and discussions of this disease have a long history, often classifying liver cancer under the categories of "Jiju", "Guzhang", "Fei Qi", etc. For example, regarding "Jiju", the Shengji Zonglurecords in the "Jiju Section": "Accumulated qi in the abdomen, if not cured for a long time, becomes firm and unshiftable when pushed – this is Zheng (fixed mass). This is caused by improper cold and warm regulation, irregular diet, leading to weakness of zang-fu organs, indigestion of food and drink. When pressed, its shape is like a firmly knotted cup or plate. If it persists, it makes the body thin and the abdomen large, remaining until death." The Huangdi Neijing also discussed "Guzhang" early on. For instance, the Huangdi Neijing states: "Abdominal distension with general body swelling, as large as skin swelling, with bluish-yellow complexion and visible abdominal veins – these are its symptoms." The Nanjing also records "Fei Qi" in the 56th difficult issue: "The accumulation of the liver is called Fei Qi, located under the left hypochondrium, shaped like an inverted cup with a head and tail.

"Jingyue Quanshu" points out that the root of liver cancer lies in the lack of healthy qi and external invasion. Professor Hua Haiqing, a modern physician, believes that the pathogenesis of liver cancer is deficiency in origin and excess in superficiality, and that cancer toxin and healthy qi deficiency coexist, so the treatment should take into account both detoxification, anti-cancer and strengthening healthy qi [15]. Professor Lv Wenliang believes that liver cancer is based on spleen-qi weakness, and the pathological changes such as phlegm-dampness, blood stasis and pathogenic toxin are the key [16]. Professor Qian Bowen's research believes that no matter how the syndrome of liver cancer changes, spleen deficiency and liver depression are its essence, but in different stages of the disease, sometimes spleen deficiency is the main factor, sometimes liver depression is the main factor. Generally speaking, in the early and middle stages of liver cancer, the pathogenesis is liver depression, but in the middle and late stages, the chance of patients is closer to spleen deficiency [17]. Professor Sun Min put forward that the general pathogenesis of liver cancer is "liver depression and spleen deficiency, dampness, blood stasis and phlegm toxin" [18]. The pathogenesis of primary liver cancer can mostly be summed up as healthy qi deficiency and pathogenic excess, healthy qi deficiency refers to the deficiency of healthy qi, which can not eliminate pathogenic factors, and the viscera can not perform their respective duties, especially the liver and spleen, which are in charge of smoothing the flow of qi. The spleen is in charge of transportation and transformation. If the liver and spleen are out of balance, it is easy to cause stagnation of qi, failure of dispersion and disorder of transportation and transformation, which will lead to stagnation of pathogenic qi and accumulation in the body, resulting in symptoms. On the other hand, if Qi and blood in the body are blocked by blood stasis and pathogenic qi stagnates for a long time, it is easy to consume healthy qi and grow internal pathogens. Excess of pathogenic factors mostly refers to the invasion of exogenous pathogenic factors into the human body, which damages the healthy qi, mostly phlegm, dampness and toxin. At the same time, internal injury of emotions and unclean diet often affect the liver, the function of spleen transportation and transformation, and the consumption of healthy qi. Therefore, the deficiency of vital qi and excess of pathogenic factors are often mixed together to form a vicious circle, which makes the condition more complex and serious. Eventually, the evil often develops into heat, toxin, blood stasis and dampness. Therefore, the treatment of liver cancer is mainly based on strengthening the body resistance, supplemented by strengthening the spleen and soothing the liver.

According to the ancient literature and the clinical experience of the above doctors and tutors, the nature of primary liver cancer is deficiency in origin and excess in superficiality. Liver depression and spleen deficiency is the main cause of liver cancer, with spleen deficiency as the root cause, qi stagnation, blood stasis, damp-heat and pathogenic toxin as the symptoms, and deficiency of vital qi and disorder of viscera as the internal factors of morbidity.

2.3 Understanding of TACE in Modern Medicine

Chemotherapeutic drug can be directly injected by selectively insert that catheter into the blood supply target artery of the tumor, so that the local drug concentration is increased, the tumor proliferation is inhibited, the tumor target artery can be embolized, and the blood supply of the tumor is cut off [19]. The method of inducing ischemic necrosis of tumor tissue is called TACE.

The principle is based on the blood supply characteristics of the liver: the liver has a dual blood supply pathway, which can be supplied by the hepatic artery or portal vein. The portal vein mainly supplies blood to normal liver tissue, while the hepatic artery is the main pathway for nutrient supply to liver cancer tissue [7]. TACE can selectively block the blood supply of the hepatic artery by using embolic agents, cutting off the main pathway for nutrient supply to liver cancer tissue, thus leading to ischemic necrosis of tumor tissue. The rational combined application of embolic materials, including lipiodol, gelatin sponge particles, blank microspheres, drug-eluting beads, etc [20], can improve the effect of chemotherapeutic

drugs. On the one hand, it can reduce the loss of chemotherapeutic drugs by blocking the blood supply arteries and microvessels of liver tumor tissue, and on the other hand, it can slow down the release rate of chemotherapeutic drugs, so as to prolong the treatment time of chemotherapeutic drugs. TACE can also make chemotherapeutic drugs act directly on tumor tissue, which can not only increase the concentration of chemotherapeutic drugs but also reduce the systemic toxic side effects of chemotherapeutic drugs. It has the advantages of high concentration, good effect, fast curative effect, long treatment time, mild side reactions, and little damage to normal tissues. At the same time, compared with surgical treatment, TACE is also minimally invasive, repeatable, and has a wide range of applications.

However, TACE also has its shortcomings, most patients will have postoperative complications after TACE, mainly post-embolization syndrome of hepatocellular carcinoma, mainly manifested as fever, liver pain, poor appetite, gastric discomfort, nausea and vomiting [21-23]. The severity and duration of symptoms are related to the type and amount of medication, as well as the age, physical condition and individual differences of patients. At present, there is no definite etiological diagnosis of post-embolization syndrome of hepatocellular carcinoma in modern medicine, but most people believe that post-embolization syndrome of hepatocellular carcinoma is mainly caused by ischemia, necrosis and subsequent cytokine release, inflammatory reaction and stress reaction of tumor tissues and some normal tissues in the liver due to chemoembolization. It is also related to various toxic and side effects caused by the use of embolic agents and chemotherapy drugs [24]. On the other hand, the embolic agents and chemotherapy drugs used in Tace can cause damage to normal liver tissue and body, resulting in damage to liver function and immune system, affecting the functional status and quality of life of patients. Moreover, TACE does not have a good long-term effect on those cancer lesions with large masses and abundant collateral circulation, and may even lead to recurrence and metastasis of the lesions. The TACE also has its limitations and cannot be applied to all patients with primary liver cancer.

2.4 TCM Understanding of TACE and Its Complications

As a common local treatment, TACE can effectively control tumors, but it is often accompanied by serious side effects, such as abnormal liver function and digestive system symptoms. Zhenzhunang Buyi Yaoxing Fu • Medication Method: “The disease of great poison must be robbed with the medicine of great poison” [25]. The etiology and pathogenesis of liver cancer are complex, which belongs to the category of “disease of great poison” in traditional Chinese medicine. The injection of chemotherapy drugs, iodized oil, gelatin sponge and other substances in TACE belongs to the category of “drug toxicity” of traditional Chinese medicine, which exerts its curative effect by “fighting poison with poison”. Therefore, it can be considered that TACE belongs to the scope of “attacking pathogenic factors” in traditional Chinese medicine.

Some scholars believe that fever, nausea, vomiting, abdominal pain and other symptoms after Tace are caused by the invasion of chemotherapy drugs and embolic agents as a foreign toxin into the body after interventional therapy for liver cancer, which blocks the middle energizer and causes the obstruction of qi movement, the liver fails to disperse, the spleen fails to transport, and the liver is damaged by the transformation of depression into heat [26]. Therefore, the TCM pathogenesis of post-embolization syndrome of liver cancer can be mainly summarized as toxin, blood stasis and deficiency. These three aspects often influence each other and cause and effect each other. If the drug poison invades the human body, it will damage the healthy qi. The healthy qi is weak and unable to stimulate qi and blood, and can not quickly discharge the pathogenic toxin, so that the pathogenic toxin is blocked in the body. It also affects the functions of the viscera, especially the liver, spleen and stomach. The liver fails to disperse, the spleen fails to transport and transform, the stomach fails to receive and descend, the viscera function is out of balance, the qi stagnates, the water stagnates, and the accumulation of dampness, heat, phlegm and other internal toxins in the body for a long time causes damage to the healthy qi again. Therefore, the therapeutic principles and methods of traditional Chinese medicine should also be based on soothing the liver, detoxifying, removing blood stasis and strengthening the body resistance.

3. Cubic Basis of Sijunzi Decoction and Xiaochaihu Decoction

Although different Chinese medicine experts have different understanding of liver cancer, most of them focus on the pathogenesis changes of liver and spleen, such as liver depression and qi stagnation, spleen deficiency and blood stasis, damp-heat in spleen, liver heat and blood stasis, etc. Some scholars used the medical case analysis platform to summarize and analyze the TCM syndromes of hospitalized patients who met the diagnosis of primary liver cancer from 2015 to 2018 (a total of 1869 cases were included), in which the tongue color was mostly dark red (47.30%), the pulse condition was the highest in the proportion of string (76.48%), combined with string thin, string number and so on. Abdominal distension, fatigue, vomiting, dizziness, bitter taste and so on are common in patients. After comprehensive analysis of the above factors, it is considered that liver depression and spleen deficiency is one of the most common types of liver cancer in clinic [27].

Modern Chinese medicine believes that chemotherapeutic drugs, as drugs, damage the liver and spleen, once the spleen and stomach are damaged, it will affect the generation of Qi and blood, “blood is weak and Qi is exhausted, Qi is opened, evil enters”, interventional embolization agents, as a kind of evil, block blood vessels, evil enters by taking advantage of deficiency, liver depression and spleen deficiency, resulting in abnormal operation of Qi, causing disorder of Qi in liver, gallbladder, spleen and stomach viscera, wood depression and soil deficiency, liver and gallbladder adverse control of the soil of the spleen and stomach. As a result, the gallbladder and stomach are not in harmony, the stomach is not receptive, the spleen does not ascend to the clear, and the qi movement in the middle energizer is abnormal, so complications such as fatigue, bitter taste in the mouth, nausea, vomiting, fever, dull pain or tingling in the hypochondrium are prone to occur after TACE. Therefore, the treatment should be based on harmonizing the liver and spleen, replenishing qi and

tonifying deficiency.

Through the meta-analysis of TCM clinical medication for liver cancer, LIU Minghao et al. [28] found that the first to fourth drugs were Atractylodes macrocephala, Poria cocos, Codonopsis pilosula and Bupleurum chinense, and the commonly used classical prescriptions were Sijunzi Decoction, Xiaochaihu Decoction, Yiguanjian Decoction, Xiangsha Liujunzi Decoction, etc.

3.1 Analysis of the Decoction

Sijunzi Decoction comes from Taiping Huimin Heji Ju Fang of the Song Dynasty, which is composed of ginseng, Atractylodes macrocephala, Poria cocos and licorice, and is a classic prescription for invigorating qi and spleen. In the formula, the ginseng can invigorate the primordial qi and tonify the spleen and lung; the Atractylodes macrocephala can invigorate qi and invigorate the spleen, so that the effect of invigorating qi and invigorating the spleen of the ginseng can be enhanced; the Poria cocos can eliminate dampness and purge heat, invigorate the spleen and tranquilize the mind, so that the Poria cocos can be combined with the Atractylodes macrocephala to enhance the effects of invigorating the spleen, removing dampness and transporting and transforming; the prepared liquorice can invigorthe middle. The whole prescription can invigorate the spleen and benefit the lung, strengthen the transportation of the lung and spleen, and promote the generation of qi and blood. The compatibility of the four herbs has the effect of replenishing qi and invigorating the spleen. The herbs in the prescription are mild in nature, tonic but not severe, warm but not dry, and all of them are neutralized, so they are named Junzi [29]. In addition to the mainstream prescriptions of "Shen, Zhu, Ling and Cao", Sijunzi Decoction also evolved into two different prescription records with the change of Dynasties. Recorded in the Ming Dynasty's "Yixue Gangmu" and "Zhengzhi Zhuncheng", which replaced the licorice in the prescription with Astragalus, and the Qing Dynasty's "Yi Zong Zhi Bian" also recorded that "there is no licorice in one prescription, there is Astragalus, each is equally divided". Astragalus membranaceus has the effects of lifting Yang and invigorating qi, consolidating the exterior and benefiting the defense, nourishing the blood and promoting the production of body fluid, and has better curative effect on qi deficiency compared with licorice, which is in line with the indications of "treating deficiency of true qi and shortness of qi and pulse" in the book. Another kind of Sijunzi Decoction was recorded in the Qing Dynasty's Revised Guang Wen Re Lun, which changed the ginseng in the prescription into western Codonopsis pilosula. Codonopsis pilosula is the mainstream product to replace ginseng. "Bi Hua Yi Jing" and "Ji Sheng Ji" recorded: "The ancient prescription with ginseng, such as powerless, to the West Dangshen instead. At present, Sijunzi Granule has been recorded in the Chinese Pharmacopoeia, but it has been greatly changed on the basis of the original prescription of Sijunzi Decoction. Compared with Sijunzi Decoction, Sijunzi Granule replaced ginseng with Codonopsis pilosula, and processed Atractylodes macrocephala by stir-frying with bran [30]. This may be because ginseng can greatly invigorate the primordial qi, restore the pulse and consolidate the collapse, which is a strong agent for warming and tonifying, while Codonopsis pilosula is sweet and smooth in nature, which is a gentle product for tonifying and slowing down. Compared with ginseng, it is weak in efficacy and can not save the emergency. If the patient is already weak, the treatment effect will be gentler if the western Codonopsis pilosula is used to invigorate qi.

Xiaochaihu Decoction comes from Shanghan Lun written by Zhang Zhongjing in the Eastern Han Dynasty. The original prescription is composed of half a catty of Bupleurum, three taels of Scutellaria baicalensis, three taels of Ginseng, three taels of Pinellia ternata, three taels of Radix Glycyrrhizae Preparata, three taels of Ginger and twelve jujubes [32], it is the main prescription for the treatment of Shaoyang diseases. Bupleurum in that formula is bitt and smooth, enters the live and gallbladder meridians, and can not only discharge the pathogenic factors of Shaoyang, but also disperse the stagnation of qi and disperse the pathogenic factors of half exterior of Shaoyang, so that the Bupleurum is a monarch drug. Radix Scutellariae is bitter and cold, and is used to clear away the heat in half of Shaoyang. It is a ministerial drug. The ascending and dispersing of Bupleurum and the descending and discharging of Scutellaria are compatible, which is the basic structure of harmonizing Shaoyang. At the same time, the Pinellia tuber and the ginger are used for harmonizing the stomach, lowering the adverse flow of qi and stopping vomiting; Due to the deficiency of healthy qi, pathogenic factors are transmitted from Taiyang to Shaoyang, so ginseng and jujube are used to supplement qi and invigorate the spleen. One is to strengthen the healthy qi to eliminate pathogenic factors, and the other is to supplement qi to resist the internal transmission of pathogenic factors. If the healthy qi is exuberant, the pathogenic factors will not be introverted. At the same time, Radix Glycyrrhizae Preparata is used to assist ginseng and jujube to strengthen the body resistance, and to harmonize various medicines, which is a messenger drug. The above herbs are used together to reconcile Shaoyang, soothe liver and relieve depression, and tonify stomach qi, so that the pathogenic qi can be relieved, the cardinal can be benefited, and the stomach qi can be harmonized, so that the disease can be eliminated by itself.

3.2 Single Drug Analysis

Ginseng is slightly bitter and warm in taste and sweet in nature. Has effect in calming that five internal organ, strengthening body resistance, eliminating pathogenic factors, and invigorate primordial qi. Clinically, it is often used for the treatment of deficiency of qi and blood and deficiency of long illness. Modern studies have found that ginsenosides, ginseng polysaccharides and ginseng alkynol are the main components of ginseng, which can increase the activity of pepsin, protect gastrointestinal mucosa, reduce gastrointestinal reactions of drugs, increase red blood cells and white blood cells, enhance hematopoietic function and improve hemogram [33]. Ginsenoside can promote the directional differentiation and amplification of hematopoietic stem cells in vitro, and inhibit tumor invasion and metastasis [34]. Combine with TACE to necrotize cancer cell and prevent their proliferation and metastasis. Ginseng polysaccharides and ginsenosides can also resist fatigue and enhance the immune function of the human body. Ginsenosides have anti-inflammatory, anti-hepatotoxicity and anti-stress effects. Ginseng polysaccharides can play an anti-stress role. Therefore,

ginseng contributes to the immune regulation of patients after TACE.

After the Qing Dynasty, Codonopsis pilosula was gradually replaced by ginseng because of its scarcity and high price. Codonopsis pilosula has the effect similar to ginseng, which can tonify the lung and spleen, promote the production of body fluid and nourish the blood. However, the basic research on the anticancer components of Codonopsis pilosula is mainly based on Codonopsis saponins and Codonopsis pilosula polysaccharides. Wu Jinglian et al. [35] showed that the polysaccharide from Codonopsis pilosula had the effect of anti-human hepatoma cell smmc-7721. Zhang Jun et al. [36] showed that Codonopsis pilosula polysaccharide had obvious inhibitory effect on the growth of HepG2 cells.

Rhizoma Atractylodis Macrocephalae [37,38], it was first recorded in Shennong Bencao Jing, and its color is yellow with fine spots. It is sweet and slightly bitter in nature and enters the stomach and spleen meridians. Has effects in invigorating qi, invigorating spleen, eliminating dampness, and promoting diuresis. Atractylodes macrocephala is considered to be the best at invigorating qi to strengthen the spleen in a large number of clinical practices of traditional Chinese medicine. Modern pharmacological studies have found that it mainly contains polysaccharides, lactones, volatile oils and so on, and its role is to improve immunity, protect the liver and resist cancer. Long Fangyi et al. [39] showed that atractylenolide I extracted from Atractylodes macrocephala can reduce the activity of PI3K/Akt/m TOR, cause cell apoptosis, and inhibit the growth of cancer cells. Atractylodes macrocephala polysaccharide and volatile oil of Atractylodes macrocephala can also play a role in promoting gastrointestinal peristalsis and improving gastrointestinal function; Atractylenolide also has antioxidant, anti-inflammatory and immunomodulatory effects, so after Tace, Atractylodes macrocephala can inhibit and kill tumor cells, alleviate gastrointestinal complications such as poor appetite, gastric discomfort, nausea and vomiting, prevent postoperative inflammation, and enhance the immunomodulatory ability of patients.

Poria cocos is the dry sclerotia of Poriferaceae, which is cut into slices or blocks after being dug out and dried. Has effects in invigorating spleen, promoting diuresis, and eliminating dampness. Modern pharmacological studies have shown that its main chemical component is pachyman [40]. Pachyman can improve the function of non-specific and specific immune system, and has obvious anti-tumor effect. Studies have shown that pachyman can significantly improve the number of peripheral blood leukocytes and platelets in mice with leukopenia after radiotherapy and chemotherapy, and can enhance the proliferation of granulocytes and the regeneration of hematopoietic cells, thus improving the hematopoietic function of bone marrow [41]. The triterpenoids in Poria cocos have the functions of anti-tumor, protecting liver, enhancing immunity and anti-inflammatory [42]. Poria alcohol can prevent liver cell necrosis and protect the liver [43]. Therefore, Poria cocos can not only be used for anti-cancer and hepatoprotective treatment of patients with primary liver cancer, but also for the prevention and treatment of acute liver damage, postoperative inflammation and other complications after TACE, as well as enhancing the immune capacity of patients.

Licorice [44,45] was first found in Shennong Bencao Jing. It is sweet in taste and neutral in nature. “Leigong Paozhi Yaoxing Jie” describes that it can “detoxify all kinds of poisons, harmonize all kinds of medicines, be sweet and urgent, and be respectfully called Guolao.” Glycyrrhiza uralensis can tonify deficiency, enter the lung meridian of the spleen and stomach, and tonify the qi of the spleen and stomach. The qi of the spleen and stomach is sufficient, and the lung qi is naturally sufficient, which can promote the recovery of healthy qi after TACE and improve the curative effect. Glycyrrhiza uralensis can detoxify all kinds of poisons, harmonize various medicinal properties, alleviate the potency of drugs, and reduce toxic and side effects, so it plays a role in detoxification and synergy in combined medication. Modern pharmacology has found that the modern pharmacological effects of licorice mainly include anti-tumor, anti-inflammatory, antiviral, liver protection and so on. Saponins and flavonoids are the main components of Glycyrrhiza uralensis, which have anti-inflammatory, antiviral, anti-tumor, liver protection and other effects. Flavonoids also have antidepressant effects. Glycyrrhiza polysaccharide also has the effect of anti-tumor, protecting the liver, and improving immunity. Therefore, licorice can not only assist TACE anti-tumor therapy, but also act as an immunomodulator to enhance immunity, prevent and treat postoperative inflammation, acute liver damage and other complications.

Radix Bupleuri is good at dispersing pathogenic qi of Shaoyang, soothing the liver and relieving depression, and weeding through the old to bring forth the new. Shennong Bencao Jing Du: “The smell is bitter and mild. It governs the accumulation of qi in the heart, abdomen, stomach and intestines, the accumulation of food and drink, the evil of cold and heat, and the innovation of the old.” Chang Yanxiang et al. [46] have found that saikosaponin d can inhibit the formation and growth of liver cancer tumors in a dose-dependent manner, promote the growth of thymus and spleen in liver cancer model mice, improve cellular immune function and enhance anti-tumor ability by increasing the levels of CD3 + and CD4 + and down-regulating CD8 + in model mice. Ji Meifang [47] believes that Saikosaponind can increase the expression of autophagosomes in human hepatoma cells, induce autophagy and apoptosis of hepatoma cells, and block the metastasis of tumor cells. Liu Zhiyan [48] found that TACE combined with Bupleurum injection could significantly reduce the serum levels of nm23, Bcl-2 and AFP in patients with liver cancer compared with TACE alone, so it was considered that TACE combined with Bupleurum alone could treat and improve the survival rate of patients with liver cancer after TACE.

Scutellaria baicalensis, Modern studies have shown that baicalein and baicalin contained in Scutellaria baicalensis Georgi have anti-inflammatory, antipyretic, antioxidant, anti-tumor and other pharmacological effects [49]. Hif-1α and VEGF can promote the formation of tumor neovascularization. Du Zhongliang et al. [50] showed that the scutellarein has an inhibiting effect on the vascularization, proliferation and migration of human liver tumor cells, and through a mouse experiment, the levels of Ki-67 and VEGF in a tumor tissue of a mouse are obviously reduced and a PI3K-AKT signal

pathway is effectively inhibited after a nude mouse successfully transplanted with a human HepG2 tumor is injected with the scutellarein at different doses for 30 days, The biological behaviors such as the migration and the proliferation of the downstream tumor cells caused by the activation are blocked. Guo Yu et al. [51] suggested that baicalin, one of the effective components of Scutellaria baicalensis, can inhibit the synthesis and secretion of AFP by human liver tumor cells, and promote the transformation of poorly differentiated and highly malignant human liver tumor cells. Hu Jingjing et al. [52] found that the large dose of Huangqin Decoction could promote the expression of PTEN in human hepatoma HepG2 cells, improve the dephosphorylation of HIF-1α Akt by PTEN, inhibit the transcriptional expression of HIF-1α, and then down-regulate the level of VEGF. Wang Guotai et al. [53] used baicalin capsules with baicalin as the main ingredient combined with TACE to treat primary liver cancer. It was found that the 3-year survival time of patients after TACE was longer than that of patients with TACE alone, and the clinical adverse reactions were less, and the side effects of chemotherapy drugs were reduced.

Rhizoma Pinelliae enters the spleen, stomach and lung meridians. Clinically, it is mainly used for eliminating dampness and resolving phlegm, lowering the adverse flow of qi and stopping vomiting, and eliminating distension and resolving masses. Its chemical constituents include alkaloids, organic acids, flavonoids, steroids and saccharides. Pharmacological studies show that Pinellia ternata has the pharmacological effects of relieving cough, drying phlegm, anti-tumor, anti-bacterial and anti-inflammatory [54]. Modern studies have found that water extract of Pinellia ternata can prolong the proliferation cycle of tumors, induce apoptosis of tumor cells and enhance the immune function of the body [55]. Tian Wenwen [56] found that PTP could significantly induce the growth and proliferation of human hepatoma HepG2 cells, and activate the Caspase cascade to induce the programmed apoptosis of tumor cells by bidirectionally regulating the expression levels of pro-apoptotic protein factor Bax and anti-apoptotic protein Bcl-2 in HepG2 cells. Zhao Yongjuan et al. [57] found that pinellia polysaccharide, the active ingredient of Pinellia ternata, can resist the growth of cancer cells in mice with liver H22 tumor cells, and can improve the physical fitness and reaction ability of mice.

4. Overview of Clinical Research on Jianpi Shugan Prescriptions Combined with TACE

The TACE is the first non-surgical treatment for patients with liver cancer. Clinical studies have shown that spleen-strengthening and liver-soothing prescriptions can improve the efficacy of TACE, reduce the adverse reactions such as liver function damage, fever, nausea and vomiting caused by TACE, and improve the quality of life of patients.

Zhu Yuhui et al. [58] found that Sijunzi decoction could increase the total effective rate by 20% and decrease the levels of ibil, dbil, TBIL, alt and AST on the basis of TACE treatment. Shen Yihao [12] showed that TACE combined with Sijunzi decoction and Chaihu Shugan San could not only reduce alt and AST, but also reduce the expression of alpha fetoprotein (AFP), shorten the duration of fever, nausea and vomiting, poor appetite, gastric discomfort and liver pain after TACE treatment, and improve the KPS score of patients. Song Pei et al. [59] have found that Sijunzi Decoction can enhance the immune function of the body and improve the anti-tumor ability of the body. The TACE can directly kill tumor cells and block the blood supply of the tumor, and the combined use of the TACE and the TACE can play a synergistic anti-tumor effect and improve the therapeutic effect. Hao Ying [60] found that xiaochaihu decoction combined with TACE could stabilize the tumor, reduce the AFP level, improve the KPS score, and improve the tumor control rate. Through the clinical observation of modified Xiaoyao San combined with TACE in the treatment of primary liver cancer (liver depression and spleen deficiency type), Yang He [61] found that modified Xiaoyao San has a certain protective effect on cellular immunosuppression caused by interventional therapy. The treatment group of modified Xiaoyao powder combined with TACE was superior to the treatment group of TACE alone in improving KPS score, reducing serum AFP level and improving TCM symptoms, and the adverse reactions of the treatment group of modified Xiaoyao San combined with TACE were milder than those of the treatment group of TACE alone. Hu Yue et al. [62] treated patients with primary liver cancer with Shugan Jianpi Jiedu Decoction combined with TACE (treatment group) and 23 patients with primary liver cancer treated with TACE alone (control group). The results showed that although there was no significant difference in the objective curative effect of tumors between the two groups, the treatment group was better than control group in the curative effect of syndromes. Shugan Jianpi Jiedu Decoction is proved to be able to reduce the adverse reactions such as hemoglobin reduction, leukopenia and liver function injury, and improve the quality of life.

To sum up, in the controlled clinical study, the use of the prescriptions with the function of soothing the liver and invigorating the spleen combined with TACE treatment can improve the curative effect, protect the liver function, reduce the expression of AFP, shorten the duration of fever, nausea and vomiting, poor appetite, gastric discomfort and liver pain after TACE treatment, improve the KPS score of patients, and improve the quality of life of patients.

5. Summary and Outlook

Although TACE can inhibit tumor progression by blocking tumor blood supply and local chemotherapy, it often causes embolic syndrome (such as fever, abdominal pain, liver function injury, etc.), and has limited long-term efficacy, which can easily lead to tumor recurrence and metastasis. Sijunzi Decoction combined with Xiaochaihu Decoction is a classic combination for liver cancer of liver depression and spleen deficiency type: Sijunzi Decoction replenishes qi and strengthens the spleen, and Xiaochaihu Decoction reconciles Shaoyang, soothes the liver and relieves depression. The combination of the two prescriptions not only tonifies the acquired root, but also regulates the liver and gallbladder qi, which is in line with the pathogenesis characteristics of liver cancer of “deficiency of vital qi and excess of pathogenic factors”. Modern pharmacological studies have shown that ginsenoside, saikosaponin d, atractylenolide and other components in the formula can cooperate with TACE to exert

curative effect by inhibiting tumor proliferation, inducing apoptosis, regulating immunity, protecting liver function and other mechanisms, while reducing the toxic and side effects of chemotherapy drugs. Clinical studies have further confirmed that the combined regimen can improve the tumor control rate, improve liver function indicators, shorten the duration of postoperative discomfort symptoms, and significantly improve the quality of life of patients. Integrated traditional Chinese and western medicine treatment mode shows unique advantages in the comprehensive management of liver cancer: the local precise treatment of TACE and the overall conditioning of traditional Chinese medicine complement each other, which not only strengthens the anti-tumor effect, but also reduces the adverse reactions of western medicine treatment, providing a more optimized treatment strategy for patients with liver cancer.

Although preliminary progress has been made in the study of Sijunzi Decoction and Xiaochaihu Decoction combined with TACE, the current study on the mechanism of action of traditional Chinese medicine compound mostly focuses on single drug components, lacking systematic exploration of the synergistic effect of the whole prescription, and the future needs to combine network pharmacology, molecular biology and other technologies. To further analyze the specific pathways (such as PI3K/Akt, HIF-1α/VEGF and other signaling pathways) of Sijunzi Decoction and Xiaochaihu Decoction in regulating the immune microenvironment of hepatocellular carcinoma, inhibiting angiogenesis and reversing tumor drug resistance, and to clarify the synergistic targets of their combination with TACE, so as to provide a more solid theoretical basis for clinical medication. Moreover, most of the existing clinical studies are single-center and small-sample trials, lacking long-term survival data and standardized efficacy evaluation system. Multi-center, large sample, randomized controlled clinical trials should be carried out in the follow-up. To sum up, Sijunzi Decoction and Xiaochaihu Decoction combined with TACE provide innovative ideas for the treatment of primary liver cancer, but the full play of its clinical value still needs the deep integration of basic research and clinical practice. Through multidisciplinary collaboration and technological innovation, it is expected to build a more efficient and individualized diagnosis and treatment system of integrated traditional Chinese and Western medicine, and open up a new path to improve the prognosis of patients with liver cancer.

References

[1] Han B, Zheng R, Zeng H, Wang S, Sun K, Chen R, Li L, Wei W, He J. Cancer incidence and mortality in China, 2022. J Natl Cancer Cent. 2024 Feb 2;4(1):47-53.

[2] Zheng R, Zhang S, Zeng H, Wang S, Sun K, Chen R, Li L, Wei W, He J. Cancer incidence and mortality in China, 2016. J Natl Cancer Cent. 2022 Feb 27;2(1):1-9.

[3] Zhou M, Wang H, Zeng X, et al. Mortality, morbidity, and risk factors in China and its provinces, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017[J]. The Lancet, 2019, 394(10204): 1145-1158.

[4] Bray F, Ferlay J, Soerjomataram I, et al. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries[J]. CA: a cancer journal for clinicians, 2018, 68(6): 394-424.

[5] National Health Commission of the People's Republic of China Department of Medical Affairs. Guidelines for the Diagnosis and Treatment of Primary Liver Cancer (2024 Edition) [J]. Chinese Journal of Hepatic Surgery (Electronic Edition), 2024, 13(04): 407-449.

[6] Bian Jinhua, Da Ting, Luo Jianmei, et al. Efficacy of ultrasound-guided percutaneous microwave ablation combined with transarterial chemoembolization in the treatment of primary liver cancer[J]. Journal of Chinese Practical Diagnosis and Treatment, 2020, 34(05): 509-512.

[7] Blackburn H, West S. Management of postembolization syndrome following hepatic transarterial chemoembolization for primary or metastatic liver cancer[J]. Cancer Nursing, 2016, 39(5): E1-E18.

[8] Li Pengjuan, Lai Li, Li Hongge. Effect of modified Longdan Xiegan Decoction on liver function and quality of life of patients with embolization syndrome after TACE for primary liver cancer[J]. Journal of Guangzhou University of Chinese Medicine, 2021, 38(05): 876-879.

[9] Shi Yu, Jiang Hua. Effect of different doses of magnesium isoglycyrrhizinate on liver function of patients with primary liver cancer after transarterial chemoembolization[J]. Modern Journal of Integrated Traditional Chinese and Western Medicine, 2016, 25(03): 286-288.

[10] Zhang Jingtao. Clinical observation of traditional Chinese medicine combined with microwave ablation in the treatment of liver cancer[J]. Journal of TCM Oncology, 2020, 2(1): 47-52.

[11] Wang Shaozhuo, Hong Lili, Liu Minglong, et al. Clinical observation of Jiawei Si Jun Zi Tang in the application after interventional treatment of primary liver cancer[J]. Tianjin Pharmacy, 2008, (01): 34-35.

[12] Shen Yihao. Clinical observation of Si Jun Zi Tang combined with Chai Hu Shu Gan San combined with TACE in the treatment of primary liver cancer[D]. Hubei University of Chinese Medicine, 2021.

[13] Zeng H, Chen W, Zheng R, et al. Changing cancer survival in China during 2003–15: a pooled analysis of 17 population-based cancer registries[J]. The Lancet Global Health, 2018, 6(5): e555-e567.

[14] Jiang Y, Han Q J, Zhang J. Hepatocellular carcinoma: Mechanisms of progression and immunotherapy[J]. World journal of gastroenterology, 2019, 25(25): 3151.

[15] Zhang Jiahao, Hua Haiqing, Shao Xiaoqing, et al. Hua Haiqing's medicine pair in the treatment of liver cancer of liver and gallbladder dampness-heat type[J]. Asia-Pacific Traditional Medicine, 2022, 18(03): 133-136.

[16] Huo Naiyue, Jia Boyi, Zhao Xin, et al. Extracts of Professor Lü Wenliang's clinical experience in the treatment of liver cancer[J]. Global Traditional Chinese Medicine, 2021, 14(06): 1091-1094.

[17] Wang Changjun, Chen Wei. Qian Bowen's experience in the treatment of primary liver cancer[J]. Journal of Traditional Chinese Medicine, 1999(08): 460-461.

[18] Liu Wei, Hou Aihua, Huang Xiaoming, et al. Clinical study on Yugan Sanjie Fang combined with Huachansu Injection in the treatment of middle and advanced

primary liver cancer[J]. Journal of TCM Oncology, 2021, 3(03): 24-29+39.
[19] Lukinović J, Miličić B, Bilić M, et al. Treatment of Early Glottic Carcinoma with Transoral Endoscopic Laser Surgery[J]. Acta clinica Croatica, 2022, 61(Supplement 4): 70-75.
[20] Takayasu K, Arii S, Ikai I, et al. Overall survival after transarterial lipiodol infusion chemotherapy with or without embolization for unresectable hepatocellular carcinoma: propensity score analysis[J]. American Journal of Roentgenology, 2010, 194(3): 830-837.
[21] Chen Xuewu, Jiang Jingwen, Zhang Yongjie, et al. Clinical observation of Danzhi Xiaoyao San in the prevention and treatment of embolization syndrome after transarterial chemoembolization for primary liver cancer of liver depression and spleen deficiency type[J]. Journal of Guangzhou University of Chinese Medicine, 2021, 38(08): 1564-1570.
[22] Zhang Songming, Shi Xiaowen, Zhang Wei, et al. Effect of self-made Peiyuan Jiedu Tongluo Decoction in the treatment of embolization syndrome after TACE for primary liver cancer[J]. Hebei Medicine, 2023, 45(08): 1208-1210+1214.
[23] Li Haixia, Yang Yuanlei, Cao Yujuan, et al. Efficacy of Jiawei Xiaoyao San combined with Jiedu Shugan Decoction in the treatment of interventional postoperative syndrome of primary liver cancer of liver depression and spleen deficiency type and its influence on serum HS-AFP level[J]. Sichuan Journal of Traditional Chinese Medicine, 2022, 40(02): 156-160.
[24] Sun Di, Ye Lihong. Professor Zhou Zhongying's clinical experience in the treatment of liver cancer[J]. Journal of Zhejiang University of Traditional Chinese Medicine, 2017, 41(11): 860-862.
[25] Li Dongyuan. Zhenzhunang Buyi Yaoxing Fu[M]. Zhenzhunang Buyi Yaoxing Fu, 1986.
[26] Qiao Xiting, Wang Keqiong, Yan Mingliang, et al. Clinical observation of modified Dachai Hu Tang in the treatment of syndrome after TACE in patients with primary liver cancer[J]. Guide to Traditional Chinese Medicine, 2016, 22(11): 28-31.
[27] Han Han, Xu Qi, Deng Tianhao, et al. Study on the TCM syndrome and treatment rules of 1869 patients with primary liver cancer in Hunan Province[J]. Guide to Traditional Chinese Medicine, 2020, 26(15): 112-116.
[28] Liu Minghao, Li Keke, Zhang Lihui, et al. Study on the medication rules of traditional Chinese medicine in the treatment of primary liver cancer in recent 10 years[J]. Chinese Journal of Information on Traditional Chinese Medicine, 2016, 23(09): 45-47.
[29] Yao Zifeng, Cui Jie, Yang Jianzhou. Analysis of the formula meaning and clinical application of Si Jun Zi Tang[J]. TCM Research, 2015, 28(06): 72-74.
[30] He Mou, Li Jing, Yang Jun, et al. Textual research on the historical evolution and key information of the classic formula Si Jun Zi Tang[J]. Shanghai Journal of Traditional Chinese Medicine, 2023, 57(04): 83-90.
[31] Comparison of Codonopsis and Ginseng[J]. Chinese Medicine Modern Distance Education of China, 2019, 17(01): 59.
[32] Zhang Zhongjing. Shanghan Lun[M]. Beijing: China Medical Science and Technology Press, 2016.
[33] Shi Z Y, Zeng J Z, Wong A S T. Chemical structures and pharmacological profiles of ginseng saponins[J]. Molecules, 2019, 24(13): 2443.
[34] Tang Bin, Cheng Xuju, Liu Jiang, et al. Research progress on pharmacological effects of ginsenosides[J]. Journal of Military Surgeon in Southwest China, 2005, (03): 45-47.
[35] Wu Jinglian, Xu Qiang, Xie Qinjian, et al. Study on the pharmacological effect of Codonopsis pilosula in anti-tumor[J]. Western Journal of Traditional Chinese Medicine, 2016, 29(08): 18-21.
[36] Zhang Jun, Yao Hui, Zhang Chong, et al. Optimization of extraction process of Banqiao Codonopsis pilosula polysaccharides and inhibition of liver cancer cells HepG2[J]. Biological Resources, 2018, 40(03): 246-251.
[37] Gu Sihao, Kong Weisong, Zhang Tong, et al. Research progress on chemical components, pharmacological effects and clinical application of Atractylodes macrocephala[J]. Chinese Journal of Traditional Chinese Medicine, 2020, 38(01): 69-73.
[38] Zhu B, Zhang Q, Hua J, et al. The traditional uses, phytochemistry, and pharmacology of Atractylodes macrocephala Koidz.: A review[J]. Journal of Ethnopharmacology, 2018, 226: 143-167.
[39] Long Fangyi, Jia Ping, Wang Huafei, et al. Study on the mechanism of atractylenolide I inhibiting the proliferation of ovarian cancer SK-OV-3 and OVCAR-3 cells[J]. Journal of Regional Anatomy and Operative Surgery, 2017, 26(02): 89-93.
[40] Cui Herong, Wang Ruilin, Guo Wenbo, et al. Research progress on chemical components, pharmacological effects and clinical application of Poria cocos[J]. Northwest Pharmaceutical Journal, 2019, 34(05): 694-700.
[41] Zhao Weiting. Clinical study on the influence of Jiawei Bazhen Decoction on bone marrow suppression after chemotherapy[D]. Anhui University of Chinese Medicine, 2016.
[42] Cui Xianhong, Zhang Peng, Zhu Di. Research progress on pharmacological activities of triterpenoids in Poria cocos[J]. China Journal of Pharmaceutical Economics, 2019, 14(12): 123-125.
[43] Li X, He Y, Zeng P, et al. Molecular basis for Poria cocos mushroom polysaccharide used as an antitumour drug in China[J]. Journal of Cellular and Molecular Medicine, 2019, 23(1): 4-20.
[44] Li Xiang, Li Ji. Research progress on pharmacological effects of active components of Licorice extract[J]. Jiangsu Journal of Traditional Chinese Medicine, 2019, 51(05): 81-86.
[45] Chen M, Zhu J, Kang J, et al. Exploration in the mechanism of action of licorice by network pharmacology[J]. Molecules, 2019, 24(16): 2959.
[46] Chang Yanxiang, Sun Liping. Effect of saikosaponin D on tumor growth and immune function in liver cancer rats[J]. Chinese Journal of Clinical Pharmacology, 2020, 36(14): 2059-2062.
[47] Ji Meifang, Xu Huichun. Effect of saikosaponin D on autophagy level of human liver cancer cells and its molecular mechanism[J]. Northern Pharmacy, 2021, 18(11): 1-4.

[48] Liu Zhiyan, Duan Xiuping, Xin Wei, et al. Effect observation of Bupleurum injection combined with TACE technology in the treatment of liver cancer[J]. Clinical Journal of Traditional Chinese Medicine, 2017, 9(26): 11-12.
[49] Zheng Yongfeng, Wang Jiajing, Fu Chaomei, et al. Research progress on chemical components and pharmacological effects of Scutellaria baicalensis[J]. Chinese Traditional Patent Medicine, 2016, 38(01): 141-147.
[50] Du Zhongliang, Cui Dongjuan, Wang Liping. Study on the mechanism of baicalein inhibiting the growth of HepG2 liver cancer cell nude mouse xenografts[J]. Chinese Journal of Cancer Prevention and Treatment, 2020, 27(11): 848-854.
[51] Guo Yu, Yao Shukun. Effect of baicalin on invasion and metastasis of human liver cancer BEL-7402 cell line[J]. Journal of Third Military Medical University, 2006, (06): 594-597.
[52] Hu Jingjing, Liu Weikun, Zhao Yabo. Effect of Scutellaria Decoction on the expression of PTEN, HIF-1α, and VEGF in human liver cancer cells and its mechanism[J]. Modern Digestion and Interventional Diagnosis and Treatment, 2022, 27(07): 859-862.
[53] Wang Guotai, Yang Xingwu, Wang Qi, et al. Efficacy observation of Scutellaria baicalin capsule combined with transarterial chemoembolization in the treatment of primary hepatocellular carcinoma[J]. Journal of Integrated Traditional Chinese and Western Medicine on Liver Diseases, 2016, 26(06): 369-370.
[54] Zuo Jun, Mou Jingguang, Hu Xiaoyang. Research progress on chemical components and modern pharmacological effects of Pinellia ternata[J]. Journal of Liaoning University of Traditional Chinese Medicine, 2019, 21(09): 26-29.
[55] Wang Yiming, Wang Qiuhong. Research progress on chemical components, pharmacological effects and toxicity of Pinellia ternata[J]. China Pharmacy, 2020, 31(21): 2676-2682.
[56] ian Wentan. Structural characterization and antitumor activity study of Pinellia ternata polysaccharides[D]. Tianjin University of Science and Technology, 2020.
[57] Zhao Yongjuan, Wang Lei, Hou Lin, et al. Study on the antitumor effect of Pinellia ternata polysaccharides[J]. Chinese Pharmacological Bulletin, 2006, (03): 368-371.
[58] Zhu Yuhui, Chai Jin. Effect of Si Jun Zi Tang Jiawei combined with interventional therapy on liver function and immunoglobulin in patients with primary liver cancer[J]. Journal of Hubei University of Chinese Medicine, 2021, 23(02): 21-24.
[59] Song Pei, Wu Jing. Effect of Astragalus Si Jun Zi Tang combined with component blood transfusion on immune function of liver cancer patients after operation[J]. Guide to Traditional Chinese Medicine, 2017, 23(21): 50-53.
[60] Hao Ying, Chi Wencheng. Clinical efficacy observation of Xiao Chai Hu Tang Jiawei combined with transarterial chemoembolization in the treatment of primary liver cancer[J]. Heilongjiang Medicine, 2016, 29(02): 260-262.
[61] Yang He. Clinical observation of Xiaoyao San Jiawei combined with TACE in the treatment of primary liver cancer (liver depression and spleen deficiency type)[D]. Guangxi University of Chinese Medicine, 2018.
[62] Hu Yue, Wang Ruiping, Zhang Wei. Clinical study on Shugan Jianpi Jiedu Tang combined with transarterial chemoembolization in the treatment of primary liver cancer[J]. Shaanxi Journal of Traditional Chinese Medicine, 2015, 36(09): 1139-1140.