The Advantages and Applications of Traditional Chinese Medicine in the Treatment of Liver Cancer

Yushan Ge *

Department of Pharmacy, Nanjing University of Traditional Chinese Medicine (Taizhou Campus), Taizhou, China

* Corresponding Author Email: 047224516@njucm.edu.cn

Abstract. As one of the most common malignant tumors worldwide, liver cancer progresses rapidly and has a poor prognosis. Traditional Chinese medicine (TCM), due to its overall regulation and low toxicity, has gradually gained attention in the field of liver cancer treatment. The current research on TCM treatment for liver cancer has gradually deepened from clinical experience summary to mechanism exploration. This article systematically analyzes the clinical application and basic research literature of TCM treatment for liver cancer in recent years, and sorts out the effects of commonly used Chinese medicines (such as Huangqi and ginseng) and classic formulas (such as Lingmao formula) in inhibiting liver cancer cell proliferation, regulating tumor microenvironment, reducing the toxic side effects of radiotherapy and chemotherapy, promoting liver regeneration, etc. At the same time, it summarizes the clinical effects of modern medical methods such as TCM combined with surgery and interventional therapy in improving treatment efficiency, reducing recurrence rate, and improving patients' quality of life. However, the current evaluation system for the efficacy of TCM in treating liver cancer is not completely unified, and there is still a lack of long-term follow-up studies with multiple centers and large samples. Future research can further improve the efficacy evaluation criteria, strengthen the exploration of the synergistic mechanism of integrated traditional Chinese and Western medicine treatment, and carry out more high-quality clinical studies to verify the long-term efficacy of TCM.

Keywords: Traditional Chinese medicine, Liver cancer, Huangqi.

1. Introduction

As a malignant tumor with high incidence rate and high fatality rate, liver cancer ranks sixth in the global incidence rate of cancer and third in mortality. In China, according to the data released by the National Cancer Center, the approximate mortality rate of liver cancer in 2022 is 182.34 per 100000 population, and the age standardized mortality rate is 96.47 per 100000 population. The number and mortality rate of liver cancer deaths in males are higher than those in females. Liver cancer is mainly divided into primary liver cancer (PLC) and secondary liver cancer (SLC). Hepatocellular carcinoma (HCC) has the highest proportion in primary liver cancer. The lack of systematic treatment methods is a reason for the high mortality rate. HCC is mainly caused by viral hepatitis, aflatoxin, alcohol consumption, smoking, and other factors. At present, the common therapies for HCC include surgical resection, liver transplantation, ablation therapy, etc. However, the postoperative recurrence rate of HCC is high. Traditional Chinese medicine (TCM) has unique advantages in disease prevention and health maintenance, especially in disease regulation, overall regulation, and reducing side effects. For example, Zhishi is the dried immature fruit of citrus, which is rich in dietary phenolic compounds, and is a common TCM used for treating liver injury. Yisong Shu and others studied the protective mechanism against liver injury more deeply through metabolomics strategies and pharmacological research, finding that Zhishi can inhibit APAP-induced apoptosis in BRL-3A cells by concurrently regulating the upregulation of the apoptosis regulator (PUMA), AMPK-SIRT1, and JNK1 signaling pathways. It conforms that Zhishi exhibits a hepatoprotective effect against APAP-induced liver necrosis by inhibiting PUMA and reversing hepatic lipid metabolic disorders, which can help improve clinical outcomes of chemically induced liver injury [1]. This article will discuss the auxiliary effects of TCM in the treatment of HCC, including preoperative prevention and treatment, intraoperative

assistant, and postoperative relief. The significance of this article is to systematically sort out the process of TCM in treating cancer and list reference studies

2. Preoperative prevention and treatment

The "Global Liver Cancer Prevention and Control Strategy and Action Plan" led by Chinese experts, published by The Lancet in 2025, points out that 60% of HCC cases worldwide can be avoided through effective intervention. Although the global proportion of hepatitis B and hepatitis C related HCC has dropped from 39% and 29% to 37% and 26% respectively, viral hepatitis is still the traditional main cause [2]. TCM can effectively prevent and treat hepatitis, thus playing a role in preventing liver cancer. Chen Boweu and his team conducted a retrospective cohort study, including patients with compensated hepatitis B cirrhosis who were followed up for 10 years with liver cancer as the endpoint event. Based on whether they received TCM treatment during the follow-up period, patients were divided into a TCM intervention cohort and a non TCM intervention cohort to clarify the impact of TCM intervention on liver cancer incidence. Ultimately, it was found that TCM treatment can reduce the incidence of liver cancer, prolong the survival time without liver cancer, and improve the survival rate without liver cancer, with good long-term efficacy [3].

In addition, metabolism related fatty liver disease (MASLD) and metabolism related steatohepatitis (MASH) are rising rapidly, and obesity and diabetes have accelerated the development of MASLD into MASH. As El Serag from Baylor College of Medicine warns, "High sugar diets, obesity, and unhealthy lifestyles are reshaping the map of liver cancer. The theory of comprehensive diet and dietary health advocated by TCM is precisely the good medicine to reduce them. TCM not only has wonderful prescriptions for treating diseases and unique therapies, but also has a comprehensive set of concepts that teach us how to live a healthy life. The liver care plan Xiao yuan provides focused on diet and sleep, regulating the liver by consuming mung beans, millet, and vitamin rich fruits, as well as supplementing enough sleep to prevent and protect it [4].

3. Intraoperative assistant

Some TCMs have antiviral properties, which can inhibit the replication of hepatitis B and hepatitis C viruses, thereby reducing liver damage and the risk of liver cancer. According to research, Lingmao Formula has a good inhibitory effect. Chen Bin et al. observed the clinical efficacy of Lingmao Fang combined with tenofovir and pegylated interferon alpha-2b in the treatment of chronic hepatitis B (CHB). In this study, the total effective rate of the research group (97.14%) was significantly higher than that of the control group (80.00%), $x^2=5.080$, $P=0.05$, and the difference was statistically significant. There was no significant difference in serum HBsAg clearance rate between the two groups at 12, 24, and 36 weeks of treatment ($P>0.05$), but the study group had a higher clearance rate at 48 weeks ($P<0.05$). After 48 weeks of treatment, the TCM syndrome scores, alanine aminotransferase, aspartate aminotransferase, and total bilirubin in both groups decreased compared to before, and the study group was lower than the control group ($P<0.01$). In terms of safety, the incidence of leukopenia and thrombocytopenia in the study group was lower than that in the control group ($P<0.05$ or $P<0.01$), while there was no difference in the incidence of influenza like symptoms, rash, and weight loss between the two groups ($P>0.05$).They found that Lingmao Fang combined with tenofovir and pegylated interferon alpha-2b had significant effects in the treatment of CHB, which could improve serum HBsAg clearance rate, improve patient liver function, and alleviate adverse reactions such as leukopenia and thrombocytopenia, with high safety [5]. In addition, TCM emphasizes holistic treatment and the balance of body functions, which can improve the body's immunity and resistance to disease. Through the combined use of TCM and western medicine, the progression of viral hepatitis can be better controlled, thus reducing the incidence of liver cancer.

During the operation for PLC, the combination of TCM and Western medicine has achieved great results. TCM can be utilized as an adjuvant therapy to enhance the body's resistance and promote

recovery without focusing on postoperative pain relief. For instance, Some Chinese herbs like Huangqi can promote liver regeneration. Li Y et al, removed 70% of the liver of mice to study the effect of Huangqi decoction on liver regeneration. Finally, liver regeneration was evaluated by assessing the liver weight ratio and the expression of representative cell proliferation marker proteins. This experiment proves that Huangqi decoction can significantly reduce liver damage and promote liver regeneration [6]. Furthermore, acupuncture therapy can be employed to regulate the body's qi and blood flow, fostering better blood circulation and potentially aiding in the healing process. By integrating TCM into the surgical treatment regimen, patients may experience accelerated recovery times and a decreased likelihood of complications, all without the addition of specific pain relief measures from Western medicine. "Puji Fang", a book of TCM, records that acupuncture and moxibustion relieves pain in patients with liver cancer: "The accumulation is as firm as a cup, staying in the abdomen, heartache and grievances, cannot eat, come and go, and the attack is impermanent. Only large needles can be used to gently prick the points and pain points, which can be fixed in a moment, and has a miraculous effect." TCM thinks that the reason for liver cancer pain is feeling external evil improper diet, deficiency of vital pneuma and emotional maladjustment. It emphasizes that the imbalance of qi and blood, as well as the obstruction of meridians, are the main pathological mechanisms leading to pain. Therefore, TCM adopts a holistic approach to treat liver cancer pain, aiming to regulate qi and blood, smooth meridians, and alleviate pain.

4. Postoperative relief

Postoperative liver cancer pain will continue to exist, and if it cannot be effectively relieved, the patient will suffer greatly. Related studies have shown that 40% of liver cancer patients develop complications due to the inability to achieve optimal analgesic effects after surgery [7]. TCM has rich experience in treating the pain of liver cancer.

In terms of physical therapy, acupuncture and moxibustion and massage are commonly used in TCM. They can adjust the breath and unblock blood vessels as a whole. Xu et al, used a combination of Leihuo moxibustion and opioid drugs to treat cancer pain, and achieved an effective pain relief rate of 90.0% [8]. Soothing liver medicine is first, which clears the liver qi,making the breath smooth. The Shuganjianpi medicine developed by Yang Ziyu and others, which invigorating slpeen and soothing liver, has an effective rate of about 84% in treating cancer pain, significantly relieving the pain [9]. Second is stasis removing medicine. When liver qi has been stagnant for a long time and produces blood stasis, it is necessary to use blood stasis medicine to unblock blood vessels. By observing the effect of Shenqi Huayu Formula on liver fibrosis after TACE (transcatheter arterial chemoembolization) surgery for primary liver cancer and using network pharmacology to explore its mechanism of action, it was found that Shenqi Huayu Formula can improve the clinical symptoms of patients with primary liver cancer after TACE surgery [10]. There are many TCMs that have extraordinary effects, which will not be listed here one by one.

Due to the lengthy process of postoperative chemotherapy, the toxic side effects of chemotherapy drugs will continue to affect patients, causing common complications such as nausea, loss of appetite, vomiting, fever, abdominal pain, etc. These complications not only affect the patient's quality of life but also hinder their recovery. TCM offers various remedies to alleviate these symptoms. Herbs like Dahuang can be used to harmonize the stomach and alleviate nausea and vomiting. Chen Dechang et al. found through group-controlled treatment that Rhubarb can effectively alleviate stomach discomfort in critically ill patients [11]. Additionally, herbs like Giseng can help boost the immune system. Xuan Han et al, using GNDP (Ginseng-derived nanoparticles) to enhance the anti-tumor efficacy of PD-1 monoclonal antibodies (mAbs) in activating tumor infiltrating T lymphocytes. The results indicate that GDNP can reprogram tumor associated macrophages (TAMs) to increase the secretion of CCL5 and CXCL9, thereby recruiting CD8 T cells into the tumor bed. This has a synergistic effect with PD-1 mAb therapy and has no systemic toxicity [12]. By incorporating these

TCMs into the postoperative treatment plan, patients may experience reduced side effects and a more comfortable recovery process.

5. Conclusion

This article summarizes the practice and value of TCM in the treatment of liver cancer, pointing out that it not only inherits thousands of years of medical wisdom but also reflects contemporary medical innovations. It emphasizes a holistic approach as its core, regulating the body's balance of Qi, blood, Yin, and Yang based on theories such as 'supporting the righteous and eliminating the evil.' It has accumulated rich experience in inhibiting tumors, improving symptoms, and enhancing the quality of life. Furthermore, TCM has significant advantages when used in conjunction with Western medicine, alleviating the toxic side effects of chemotherapy and targeted therapies, and improving patient tolerance and treatment outcomes. Clinical studies have confirmed that the combination of TCM and Western medicine can enhance objective response rates and prolong survival. The significance of these results lies in validating that TCM is not a static remnant of traditional medicine but a dynamic system that can complement and integrate with modern medicine. Its concept of 'individualized treatment' aligns closely with modern precision medicine, providing a reference direction for further exploration of optimal collaborative plans between TCM and Western medicine, as well as for uncovering the modern pharmacological mechanisms of classic prescriptions. Currently, there are still limitations in this field, such as the specific mechanisms of TCM in treating liver cancer not being fully understood, and the sample size and design standard of some clinical studies need improvement. In the future, with deeper integration of modern technology and TCM, it is necessary to further utilize techniques such as molecular biology to analyze the action targets of TCM, promote the standardization of clinical research, and optimize individualized treatment plans, allowing TCM to play a more critical role in the comprehensive treatment system for liver cancer, helping to tackle the challenges in liver cancer treatment.

References

[1] Shu Y, He D, Li W, et al. Hepatoprotective Effect of Citrus aurantium L. Against APAP-induced Liver Injury by Regulating Liver Lipid Metabolism and Apoptosis. International Journal of Biological Sciences, 2020, 16 (5): 752 - 765.

[2] Chan S L, The Lancet Commission on addressing the global hepatocellular carcinoma burden: comprehensive strategies from prevention to treatment. The Lancet, 2025, 406 (10504): 731 - 778.

[3] Chen B W, Sun X H, Zhu X J, et al. A retrospective cohort study on traditional Chinese medicine treatment for preventing hepatocellular carcinoma in patients with compensated hepatitis B cirrhosis. Chinese Journal of Integrated Traditional and Western Medicine on Liver Diseases, 2025, 35 (3): 269 - 273.

[4] Xiao Y. Traditional Chinese Medicine Health Preservation: Nourishing the Liver in Spring Does Not Necessarily Mean Eating More Liver. Agricultural Products Market Weekly, 2014 (15): 55.

[5] Chen B, Huang W, Zhu P, et al. Clinical efficacy of Lingmao Formula combined with Tenofovir and Peginterferon α-2b in the treatment of chronic hepatitis B. Clinical Rational Drug Use, 2025, 18 (11): 86 - 88, 92.

[6] Li Y, Yang X, Bao T, et al. Radix Astragali decoction improves liver regeneration by upregulating hepatic expression of aquaporin-9. Phytomedicine, 2024, 122: 155166.

[7] Haroun R, Wood J N, Sikandar S. Mechanisms of cancer pain. Frontiers in Pain Research, 2022, 3: 1030899.

[8] Xu P, Xu W, Yuan W H, et al. Observation on the efficacy of thunder-fire moxibustion combined with opioids in the treatment of cancer pain. Laboratory Medicine and Clinic, 2021, 18 (19): 2875 - 2877.

[9] Wan Q, Yang Z Y, Guo C X, et al. Clinical efficacy of Shugan Jianpi Jiedu Formula in the treatment of liver depression and spleen deficiency syndrome after intrahepatic cholangiocarcinoma surgery. Academic Journal of Second Military Medical University, 2021 (1).

[10] Wan Z X. Effects of Shenqi Huayu Formula on liver fibrosis after TACE surgery for primary liver cancer and network pharmacology exploration [D]. Guangdong: Guangzhou University of Chinese Medicine, 2024.

[11] Chen D C, Yang X Y, Li H J, et al. Therapeutic study of rhubarb on gastrointestinal complications in critically ill patients. Chinese Journal of Emergency Medicine, 2001 (3).

[12] Han X, Wei Q, Lv Y, et al. Ginseng-derived nanoparticles potentiate immune checkpoint antibody efficacy by reprogramming the cold tumor microenvironment. Molecular Therapy, 2022, 30 (1): 327 - 340.