

## Chapter 06

# Botanicals and Traditional Chinese Medicine

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### ABSTRACT

About thousands of years ago, the use of traditional Chinese and botanical medicine has a vibrant history, with herbal and plant-based medications playing a significant role in treating several disorders and promoting well-being. Traditional Chinese medicine, rooted in herbal medications, have been a major source of modern pharmaceutical treatment, with various active complexes recognized and produced from floras. Traditional Chinese Medicine has been involved in disease prevention, treatment, and health improvement, which offer therapeutic choices for conditions ranging from cardiovascular disorders to autoimmune diseases and cancer. Traditional Chinese Medicine is deeply rooted in theoretical philosophies such as the "Yin Yang" and "Five Elements" which provided a complete outline for the understanding of diseases and health. The fundamental concepts like "Qi" and "Blood" highlight the importance of energy balance and circulation in sustaining health. TCM uses many herbs, with thousands of herbal formulas established and applied in clinical training. The therapeutic uses of TCM cover numerous disorders such as, cardiovascular disorders, cerebrovascular diseases, tumor treatment, and infectious diseases. Many clinical studies have confirmed the effectiveness of TCM formulation in different situations like, hypertension, coronary heart disease, Parkinson's disease, stroke, cancer, and malaria. These formulations often include many herbs and target multiple physiological systems at the same time to attain healing effects. Generally, botanical, and traditional Chinese herbal medicine proposes a valuable therapeutic method, which is categorized by multiple targeting features and low toxic adverse effects.

### KEYWORDS

Traditional Chinese medicines; Botanical medicines; Herbs; Diseases; Herbal medicines

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### INTRODUCTION

Plants and herbal based medicines have been used throughout history in different traditional medicine systems for promote well-being (Newton, 1991) (Jaiswal et al., 2016). Subsequently, plants are at the origin of the western pharmacopeia, as the major source of the modern pharmaceutical industry was the traditional medicines (Corson and Crews, 2007). A significant approach of Western pharmaceuticals is to identify the active molecular compound by the use of therapeutic effects of plants to chemically synthesize it (Li et al., 2015).

Due to the degeneration of the ecological system, the major resources of plants and herbal medicines have been in danger of extinction. TCM (Traditional Chinese Medicine) involves improving health, disease prevention, and treatment of several diseases such as autoimmune diseases, cancer and CVD (Cardiovascular Disorder) (Ma et al., 2019). TCM is a major source for pharmaceutical research and development. There are some Traditional Chinese Medicines which are shown remarkable effects in disease treatment, such as digitoxin, celastrol, artemisinin and quinine.

In 2015, Nobel Prize was awarded in Physiology and Medicine which is based on the use of artemisinin remedies to cure malaria (Su and Miller, 2015). Traditional plant studies involve to identifying herbal plants with similar phytochemical contents which help to identify the species that can be quantitatively and qualitatively relieved (Gospel Ajuru, 2017). Such global studies facilitate the utilization and protection of herbal plant resources which have been oppressed due to high commercial land.

Traditional Chinese Medicine (TCM) is based on two Chinese philosophies of "Five Elements" and "Yin Yang" (Wei Ling, 2020). About 2000 to 3000 years ago, Huangdi Neijing was the most ancient Traditional Chinese Medicine (TCM) (Catic et al., 2018). TCM basic theory includes Qi, meridians, blood and five zang organs and six fu organs (Hao et al., 2011). TCM divides the disease cause into two groups, internal causes and external causes. TCM distinguishes disorders according to interior, exterior, heat, cold, excess (Shi), deficiency (Xu) and eight principles Ying Yang (Matos et al., 2021).

The most common substances used in Traditional Chinese Medicine are herbs (Y. F. Chen, 2012). About 11000 herbal plants have been documented in several TCM-related pharmacopeia and approx. 700 herbal species are the most commonly used ones (Eigenschink et al., 2020). Traditional Chinese Medicine is the combination of multiple herbal formulas for disease treatment and thousands of herbal formulas have been created and are broadly useful in clinics.

Traditional Chinese Medicine formulas contain many effective ingredients that stimulate multiple targets simultaneously in the cells, which help to establish a stable physiological controlling system patients and disease treatment (Sucher, 2013) (Xu et al., 2019).

### **Overview of Botanical and Herbal Medicines in TCM**

People have used herbal plants for healing for centuries. Botanical or Herbal plants and their products have been used with varying success to prevent and cure different diseases throughout history. Approximately 5000 years ago in Sumerian times, there are written records of medicinal plants and archaeological archives even suggest past use of herbal plants (Russo, 2007). The strong bond began to unwind in 1897, when Friedrich Bayer and Co. generated acetyl-salicylic acid (Aspirin) (Raskin et al., 2002).

Botanical and Herbal medicines are the use of plant herbs and plants extracts used for therapeutic purposes to provide support to different physiological systems, to cure, prevent and treat disease in humans or animals (Kumar and Kumar, 2009). In developing countries, about 70-80% of the world's population is dependent on non-conventional medicine treatment in primary healthcare as reported by WHO (Kumar and Kumar, 2009).

### **Importance of Herbs and Botanical TCM**

Though Chinese massage and acupuncture have been well-known and adept in the west. Chinese herbology and clinical diagnosis are very significant components of Traditional Chinese Medicine (Dong, 2013). Traditional Chinese Medicine (TCM) has been carried out for the treatment of various clinical disorders in China. In 1950, Mao Zedong Chairman authorized an attempt to generate a formal medicine (Wei, 2013). The major change in this medicine is to eliminate everything that is considered to be illogical.

### **Yin Yang Theory of Traditional Chinese Medicine**

Yin Yang is the two opposing forces of nature, which represent the understanding of dialectical phenomenon. The active interplay of these two opposite forces forms a unity. In ancient times, the sages permanently attributed inner strength, life forces, and movement to the opposite forces of Yin and Yang (M. Lu and Busemeyer, 2014). "Dao" or the dynamic rules of both the universe and the human mind is placed within the framework of the oneness of these opposites.

The Ying Yang concept was used by the ancient philosophers to convey how each of them corresponds to everything in the universe (M. Lu and Busemeyer, 2014) (Wang, 2013). For instance, everything in the world has "Yin and Yang" which was claimed by LaoZi in Dao de Jing. According to Yi Jing, every phenomenon in the universe is dependent upon "one Yin" and "one Yang". In Nei Jing and in Su Wen, it is stated the Ying Yang theory that (Lu and Busemeyer, 2014)

"Ying Yang is a theory of the universe, Heaven and Earth, everything follows these dynamic laws of change, including life and death. It is the answer to the mystery of life handed down from our intellectual temple. Medical treatment also must follow this law."

Everything is based on the "Yin and Yang" hypothesis, which was put forth by scientist Niels Bohr in the 20th century (Leong, 1926). According to this theory, Yang stands for one, odd, white, heat, light, disarray, and dispersal, and Yin for zero, even, black, cold, darkness, organization, and unity. These principles are always evolving, since they adapt to the distinctive patterns or laws of nature, known as the "Dao". To maintain balance between "Yin and Yang" leads to harmony with the "Dao" (M. Lu and Busemeyer, 2014). The Chinese culture, including geography, astronomy, digital art, classic literature, medicine and philosophy has been significantly impacted by the belief. Initially used for prediction, the Yi Jing has developed into a book of wisdom that offers predictions for the future and advice on what to do (Matthews, 2016).

About 2000 years ago, Traditional Chinese Medicine has been evolved (Chan, 2016). It was progressing from its early stages to advanced level by the continuous effort of physicians. In ancient time, the book of Nei Jing, Su Wen and Ling Shu involved a wide range of medical subject areas like diagnosis, therapy, physiology, prevention, pathology and medication (Unschuld, 2016). This comprehensive coverage laid the foundation for the development and refinement of Chinese medicine into its present form.

Yin Yang principle in TCM provides a background for the understanding of disease symptoms (Hu and Liu, 2012). The symptoms of diseases such as, poor blood circulation and fever are described by Yin Yang principle;

- "Yin" includes shortness of breath, cold limbs, listlessness, looks bleak, lack of desire to talk, loose stools, clear urine, pale tongue, no feeling of thirst, and thin weak pulse.
- "Yang" includes a fever, fast breathing, inflamed face and hot body, irritability, always feeling thirsty for cold drinks, excessive speech, constipation dry stool, pale yellow or red/pinkish urine, fast and powerful pulse, and tongue with yellowish layer.

For instance, high blood pressure may be caused by hyperactivity of "Yang" due to a deficiency of "Yin", while contact with cold and damp wind "Yin" may cause a cold body and to maintaining balance is contradicted by fever "Yang" (Gao, n.d.). For TCM diagnosis, it is important to apply Yin Yang principle accurately. In case of misinterpretation, it may cause misdiagnosis and unsuitable medication for the patient.

**Five Element Theory**

Traditional Chinese Medicine (TCM) practitioners integrate the Five Elements concept for medical consultations to evaluate and explain body imbalances (Pun and Chor, 2022). The Five Elements are fire, wood, metal, earth and water, which represent the distinct features of the human body (G.-M. Chen, 2007). Traditional Chinese Medicine links the element of earth with an examination of the stomach and spleen, while fire with in examination of the heart, pulse, and tongue. Water corresponds to bones and ears, wood to spring and eyes and metal to muscles and the mouth (Catic et al., 2018). Traditional Chinese Medicine (TCM) practitioners associate these five elements with 12 main organs of human body, considering them as an interrelated whole.

For instance, lungs and the large intestine are associated with earth, while spleen and stomach are related with earth. A circular cycle is formed by this interrelation where each element effects another, metal condenses water, earth affects metal, wood fuels fire, fire creates earth, water feeds wood (Reinprecht, 2016). The understanding of these elemental relationship is critical for the TCM practitioners in diagnosis and treatment of imbalances in body effectively.

**Qi and Blood Theory**

“Qi” and “Blood” are important concepts in Chinese Medicine, as blood is recognized in both Traditional Chinese Medicine(TCM) and WM (Western Medicine) literature because of its tangible nature and its importance in pathological and physiological processes (X. Wang et al., 2011). However, blood is recognized in Western Medicine, so the concept of “Qi” being intangible is not included. A new viewpoint on “Qi” arises due to presence of gaseous signaling molecules which offers experimental understanding (W. W. Li et al., 2013). H<sub>2</sub>S is supposed as a fundamental element in “Qi” in TCM (D.-D. Chen et al., 2023). TCM detects Blood Stasis Syndrome as an important underlying pathology in many diseases, which is associated with the disruption of “Qi” flow.

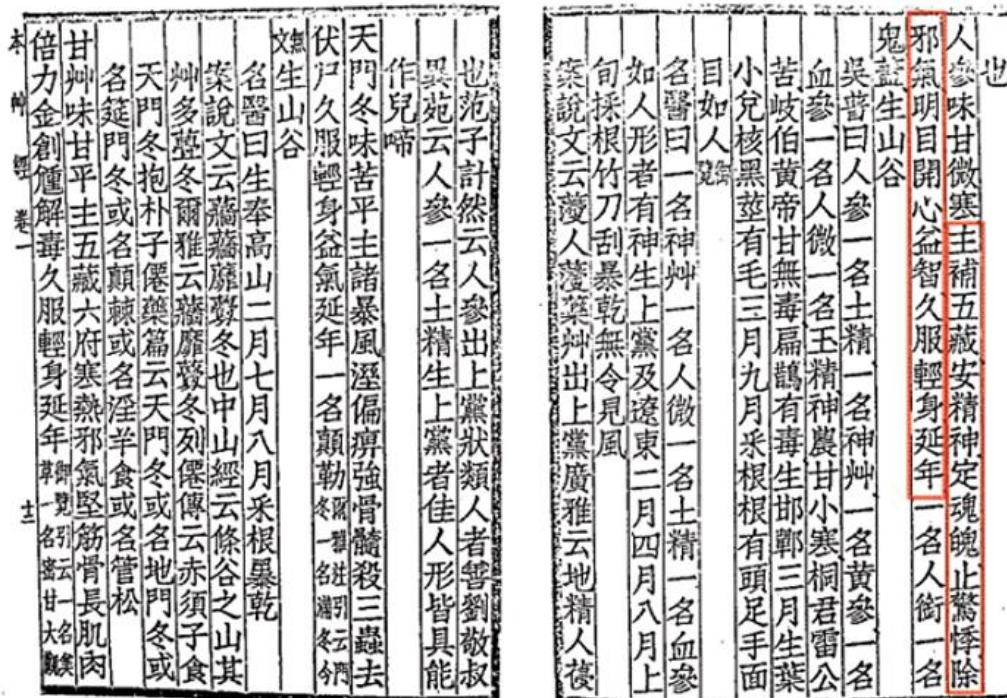
The important concept of TCM is that, “Qi” is supposed to be a dynamic source of energy for the body. “Qi” is maintained by the nutrients of the stomach and spleen and it inhales fresh air through the lungs, and “Qi” is generated from the parent’s reproductive genetic essence (Cheng et al., 2016). As an important constitution of body, “Qi” maintains different physiological functions of body, such as, immune defense, distribution of nutrients, temperature, growth, cellular differentiation and complex molecular mechanisms (W. W. Li et al., 2013). Thus, “Qi” controls the normal development of life, from birth to growth, maturity to decline and death.

**Botanical and Herbal Plants Used in Traditional Chinese Medicine**

**Ginseng (Ren Shen)**

The most important ginseng herb is “*Panax Ginseng*”, a traditional Chinese curative plant that has been used therapeutically in East Asia. In Japan, Korea and China the most valuable medicinal herb is Ginseng. The meaning of Panax is “all healing”, it describes that the panax can heal all the body aspects. The most common Ginsengs are Chinese ginseng (*P. Notoginseng*), American ginseng (*P. Quinquefolium* L.) and ginseng (*P. Ginseng* Meyer) (Park et al., 2012).

Among the all varieties of Ginseng, *P. Ginseng* is the most extensively researched type, also received the most attention. It is temperature and soil-sensitive, therefore, it is cultivated in specific areas.



**Fig. 1:** The prescription of Ginseng which explain the function of Ginseng. It was described in Shennong Bencaojing which was written in 1<sup>st</sup> century and author is unknown(Park et al., 2012).

### Liquorice Root (Gan Cao)

The popularity of herbal drugs is rising as alternative medicine globally. Drug-herb and herb-herb interaction is the common debating topic now a days, these combination therapies show potential and valid clinical benefits (Hazra and Singh, 2024). Liquorice (*Glycyrrhiza*) is the most common and found in approx. 60% of all prescriptions of TCM(Q. Zhang and Ye, 2009). Liquorice is derived from roots of *Glycyrrhiza uralensis* Fisch, *Glycyrrhiza inflata* Bat and *Glycyrrhiza glabra* L and is used widely in herbal medicines, and originate from Asia and Southern Europe (Fiore et al., 2005). It is popular in candies because of its sweet taste and sweets in Europe. In China, it is widely used in Traditional Chinese Medicines (TCM). According to Traditional Chinese Medicine Theory, liquorice is effective in the treatment of asthma, debilitation, fatigue, drug toxicity and extreme phlegm.

### Astragalus (Huang Qi)

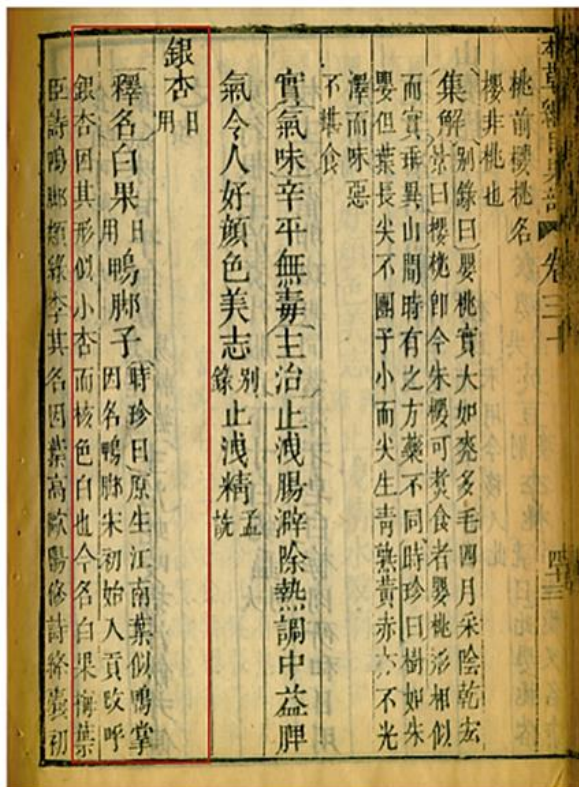
In China, Astragalus is known as Huang qi which is most extensively used herbal medication globally. The source of Astragalus is from the root of var. *mongholicus* (Bge.) Hsiao or *Astragalus membranaceus* (Fisch.) Bge or *Astragalus membranaceus* (Fisch.). Bge. This herb is well-known for its properties as refresher, diuretic, expectorant and hepatoprotective (Thorne Rese et al., 2003). Astragalus has exhibited its antihyperglycemic, antioxidant, anti-inflammatory, antiviral and immunomodulating activities (Jin et al., 2014). Usually, it was employed for the treatment of various health related issues such as, wounds, allergies, fever, uterine prolapse, loss of appetite, anemia, uterine bleeding and weakness.

In medical settings, it is utilized to treat gastrointestinal disorders like gastric ulcer and diarrhea and chronic phlegmatic disorders. Astragalus has been used for the treatment of renal disorder in Traditional Chinese Medicine for over 2000 years and is documented in the Shen Nong's *Materia Medica*, it was written in Han dynasty (Y. Zhang et al., 2019). Currently, the composition of Huang qi extract with water is used in the injections to treat various diseases.

### Ginkgo Biloba (Yin Xing)

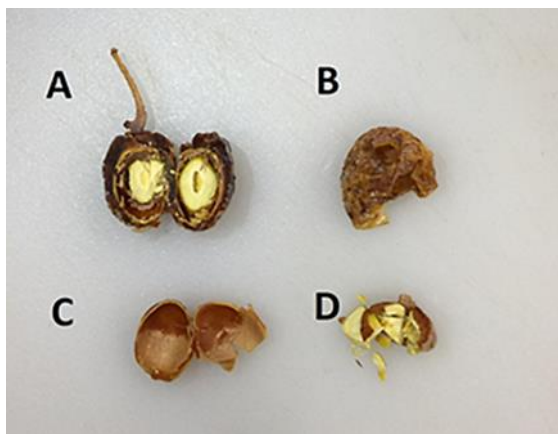
Ginkgo is scientifically known as "Ginkgo biloba", it is an ancient and exclusive deciduous tree and is well known for its therapeutic properties (Isah, 2015). Ginkgo extract includes a wide range of health benefits such as, anticancer, hepatoprotective, antihypertensive, antidiabetic, antioxidant, antimicrobial and immunostimulant activities (Noor-E-Tabassum et al., 2022). Moreover, it is known for its ability to combat neurodegenerative diseases and improve memory (Galil Hassan et al., 2016). The active primary compounds of the Ginkgo Biloba are the flavone glycosides like, terpene lactones, proanthocyanins, kaempferol, isorhamnetin, rhamnose, alkylphenols, D-glucaric acid, glucose, quercetin, ginkgolic acid and various other organic acids.

Traditionally, Ginkgo kernels have been consumed in nuts and also used in medicines (Galil Hassan et al., 2016). Ginkgo has shown many significant pharmaceutical applications, it is used for the treatment of Alzheimer's disease, vascular disease, vascular insufficiency, premenstrual syndrome, macular degeneration, liver fibrosis, vertigo, tinnitus, cardiovascular disease, impaired cerebral performance, memory issues and antidepressant-induced sexual dysfunction (Holmes et al., 2010).



**Fig. 2:** The page shown in the picture is the 1<sup>st</sup> page of Ginkgo record and the highlighted text with red box is stated as; "Ginkgo (yin Xing) (daily use). Explanation of its name [alternate name] White Fruit (Bai Guo) (daily use) [other name] Duck Foot." (Chassagne et al., 2019)





**Fig. 3:** Dissection of Ginkgo seed. A) Whole Ginkgo Seed. B) Seed Coat. C) Nutshell D) Seed nut or Kernel(Chassagne et al., 2019).

### Therapeutic Uses of Traditional Chinese Medicine

Traditional Chinese Medicines play essential role in the treatment of cardiovascular disorder, cerebrovascular disorders, tumor treatment and infectious diseases.

#### Cardiovascular Disorder

##### Hypertension

In one of the clinical studies, Traditional Chinese Medicine used to treat hypertension. It was RCT (Randomized controlled trial) which consist of 251 hypertension patients, it was reported that the blood pressure of trial group after (24 hours) use of Tianma Gouteng granules were significantly lower ( $p \leq 0.012$ ) as compared to non-trial group (placebo group)(D. Y. Zhang et al., 2020). Furthermore, it was confirmed that the use of Tianma Gouteng granules for hypertension is safe and effective and also no side effects.

Qian yang decoction contains 6 following drugs: Shudihuang (*Rehmanniae Radix Praeparata*), Gouteng (*Uncariae Ramulus Cum Uncis*), Danggui (*Angelicae Sinensis Radix*), Nvzhenzi (*Ligustri Lucidi Fructus*), Muli (*Ostreae Concha*), and Jili (*Tribuli Fructus*). This decoction has the result of pacifying the liver, tonifying blood, calming yang, and healthful Yin (Luo et al., 2023).

##### Coronary Heart Disease

In China, Chinese medicine has become popular, with the approximation of 1/3 patients in the big hospitals receiving the treatment program of Chinese medicine (Tachjian et al., 2010). In 1970s, the well-known renowned practitioners of TCM Prof. Chen Keji and Guo Shikui, they first proposed coronary heart disease treatment by undertaking blood stasis and activation of blood. With the help of clinical studies, they confirmed the effectiveness of Chinese medicine and also established Coronary Heart II (Luo et al., 2023).

Professor Chen proposed acute myocardial infarction pathogenesis by his clinical experience as the "combination of blood stasis with growth of filth and phlegm"(Luo et al., 2023). By using Yugeng Tongyu decoction, patient was treated with effects of refill Qi, removing turbidity, clearing bowels and activating blood, the incidence of disease complications and the rate of rehospitalization were reduced due to some critical events and the quality of life of patients improved by the use of a combination of conventional Western medicine.

##### Heart Failure

A randomized controlled trial (RCT) study confirmed the efficacy of Qili Qiangxin capsules, a formulation containing 11 drugs including, Renshen, Huangqi, Tinglizi (*Lepidii Semen*) and Fuzi (*Aconiti Lateralis Radix Praeparata*). The study revealed significant decreases in levels of N-terminal brain natriuretic peptide precursor (NT-proBNP) and improvement in parameters such as, New York Heart Association classification, 6 minutes' walk distance, and left ventricular ejection fraction (Li et al., 2013).

#### Cerebrovascular Disorders

##### Parkinson's Disease

In current years, TCM has revealed improvement in the treatment of Parkinson's disease and the complications associated with it. For Parkinson's Disease, a special Chinese medicine formula used which is known as Zishen Pingzhan granules, it consists of 12 herbal elements including Shudihuang, Tiannanxing (*Arisaematis Rhizoma*), Sangjisheng (*Taxilli Herba*), Tianma, Ezhu (*Curcumae Rhizoma*), Baishao (*Paeoniae Radix Alba*), Zhimu (*Anemarrhenae Rhizoma*), Baihe (*Lilii Bulbus*), Shichangpu (*Acori Tatarinowii Rhizoma*), Jiangcan (*Bombyx Batryticatus*), Yuanzhi (*Polygalae Radix*) and Gouqizi (*Lycii Fructus*). In a study, which involved 200 Parkinson Disease patients with depression who were already taking pramipexole (an antihistamine used for PD treatment), administration of Zishen Pingzhan granules or a placebo for 12 weeks resulted in significant improvement in depression scale scores and Parkinson's Disease sleep scale scores among patients in the TCM group as compared to those in the placebo group (Ning et al., 2022). Additionally, TCM group patients confirmed improved safety and tolerability.

## Stroke

Approx. 80% of the patients receive traditional Chinese medicine for the treatment of acute stroke during hospitalization. A Chinese herbal medicine formula (Dihuang Yinzi) which is effective for the treatment of various cerebrovascular diseases (Huang et al., 2010). A study was conducted on 87 patients with Ischemic stroke within 30 days of beginning. The patients were treated by using either Dihuang Yinzi or a placebo over a period of 12 weeks. The results presented significant improvement in Fugl Meyer score, assessing Barthel Index, motor function and daily living activities in the TCM treatment group as compared to placebo group (Yu et al., 2015).

Moreover, Wang et al (J. Wang et al., 2017) scientifically studied randomized controlled trials (RCTs) of Erigeron injection for the treatment of cerebral infarction and found potential benefits in reducing neurological damage and improving quality of life. However, they noted the requirement for higher quality studies to further support these results.

## Tumor Treatment

Traditional Chinese Medicine plays an important role in the treatment of cancer at different stages and helps in the body recovery process, due to the many advantages of TCM including its ability of multiple targeting features of cancer and its low toxicity (Qi et al., 2020). A randomized controlled trial of 5834 patients studied in cancer treatment by the use of Chinese medicine, it revealed that 70% of the patients in these trials showed improvement in quality of life, biomarker level and relief from symptoms when compared with conventional treatment group (C. L. Lu et al., 2021). These positive results were experimental whether Chinese medicine was used independently or in combination with the conventional cancer treatments.

## Infectious Diseases Treatment

For Thousands of years Traditional Chinese Medicine has been used for the treatment of infectious diseases and as the research has progressed and the evidence supporting this statement has expanded. A study was conducted on 3428 expected women across four African countries with Falciparum Malaria concluded that one of the artemisinin combinations is dihydroartemisinin piperazine, which was effective and established as safety profile (Pekyi et al., 2016).

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