



Ensuring Quality Standards of Traditional Chinese Medicine

RABIA CHOUDHARY¹, Wafa MAJEED^{2*}, ASRA IFTIKHAR³, IFRAHA ABBAS⁴, MUHAMMAD SAAD TARIQ¹,
MARYAM IFTIKHAR⁵, HASEEBA FARRUKH¹, AYESHA¹

¹Institute of Physiology and Pharmacology, University of Agriculture, Faisalabad, Pakistan

²Department of Pharmacy, University of Agriculture, Faisalabad, Pakistan

³Akhtar Saeed College of Pharmacy, Rawalpindi, Pakistan

⁴Riphah Institute of Pharmaceutical Sciences, Riphah International University, Faisalabad, Pakistan

⁵Department of Food Science and Technology, Government College Women University, Faisalabad, Pakistan

*Corresponding author: wafa.majeed@uaf.edu.pk

SUMMARY

Traditional Chinese medicine is a medical science that has been used to diagnose and treat diseases for thousands of years. Practitioners use acupuncture (acupressure, electro-acupuncture and laser acupuncture) and Cupping (retained, letting and moving cupping) techniques to treat diseases. The World Health Organization (WHO) lists significant problems with implementation of TCHM products including lack of statistical data and lack of methodological standards necessary to control and regular provision, application of medicinal and natural products. According to 2013 data from the State Administration of Chinese medicine in China, there are 45 Chinese medical schools and 215 other schools offering Chinese medicine programs, Chinese medicine, acupuncture techniques and massage. Plant resources are high in China. About 10% of approximately 300,000 species of higher plants are studied in China. Chinese people use herbs to treat diseases. *Polygonatum odoratum*, *Prunus armeniaca*, *Prunella vulgaris*, *Punica granatum* and many other plants used to treat fever, arthritis, bacterial infections, diabetes, diarrhea and vomiting.

INTRODUCTION

Chinese Medicine has been used to prevent, diagnose and treat diseases for thousands of years. It is based on the concept of “qi” (body energy) moving along meridians in the body (Yin et al., 2024). It affects people’s faith, thoughts, wisdom and physical health. The goal of Chinese medicine is to improve the stability and harmony of Yin and Yang opposition in the body, which block qi and cause disease. Acupuncture, also known as Eastern medicine and Chinese medicine, consists of nutritional planning, phototherapy, meditation, physical education and massage. It is based on the concept of Yin and Yang, when Yin and Yang are stable, you will feel good/comfortable and strong (Chan et al., 2015). Practitioners also believe that there is a force called “qi” flowing in the body. When Yin and Yang and qi flow are stable, the body will be strong and will work independently. Disability can occur when qi is too low and present in only one of the body’s energy channels called meridians, and when the flow of qi is blocked (Keji & Hao, 2003).

In the traditional Chinese medicinal system, emotions and bodily fitness are closely attached. This is an integrated mind-frame application to fit and relieve operations in an active loop

in which emotions affect the fitness of the body. For instance, according to Traditional Chinese Medicine (TCM) concept, extreme irritability and anger can have an effect on the body and result in more than one disease which include headache, redness of face and eyes, faintness and dry mouth. Liver is the key regulator of Qi throughout the body. Lack of harmony in the liver can result in furious moods. Fear can have an effect on the kidneys, worry with spleen, sadness with lungs and joy with heart (Zhou et al., 2022).

HISTORY

The origin of Chinese medicine may be traced back to China’s Zhou Dynasty and perhaps earlier, as the earliest medical records can be found in the *Book of Changes* (Yi Jing) and *Classic of Poetry* (Shi Jing). The principle of Yin and Yang representing the maximum of the active spectrum of cold and hot, male and female, internal and external is close to Westerners. If we apply this concept to the human body image, Yin and Yang are associated with many bodies and organs and even the person who feels hot and cold (Ma, 2000). In the early 20th century, Chinese medicine, which was close to natural medicine, became the most important medicine for most Chinese. The history of Chinese herbs is often about

imaginative and comforting stories. Whether passed down by word of mouth or in traditional form, experience of these stories preserved healing process of Chinese people in past and proved Chinese people's belief in natural medicine to this day. Although traditional medicine is widely known and inexpensive in China, it seems that majority of countries does not know enough about TCM. In China herbal medicine just like religion, belief that natural medicine can cure diseases is safe and life safer (Newman, 2020).

COMPARISON OF WESTERN MEDICINE AND TCM

TCM has a history spanning thousands of years. In many cases these medicines protected Chinese people from serious illnesses. Chinese medicine is widely distributed around the world. Traditional Chinese medicine played an important role during SARS (severe acute respiratory syndrome) epidemic. COVID-19 is classified as a "Pestilence" in Chinese medicine. The main symptoms are fever, tiredness and dry cough. The disease is in the lungs and affects spleen, stomach and heart. During SARS phase, Chinese medicine played an important role in "China's fight against pestilence" and saved many lives (Shi et al., 2020). Current evidence shows that treatment is simple compared to Western medicine; Chinese and Western medicines are also effective in treating COVID-19 (Jin et al., 2021). However, samples in these studies were small and there is no strong evidence regarding benefits and harms of combination drug used for COVID-19 (Liu et al., 2020).

TRADITIONAL CHINESE MEDICINE PHARMACEUTICAL FACTORIES

The state administration of Chinese Medicines of the People's Republic of China said that in 1995, about 1020 Chinese medicine factories produced about 400,000 tons of Chinese medicine products worth 17.9 billion Yuan (about US\$ 2 billion). There is a movement in Chinese pharmacies, mostly small manufacturers, to produce traditional Chinese herbal medicine (TCHM) products that meet international quality standards such as Good Manufacturing Practices (GMP). Traditional Chinese drugs and their products are widely used in China and sold in many parts of world. Since China has become a member of World Trade Organization (WHO), China is expecting to import more Chinese pharmaceutical products in future. Therefore, scientific research on TCM and its benefits has been supported by Government and contributed by enterprises. In China, Chinese medicine is sold by pharmacists as both Over the Counter (OTC) and prescription drugs (Dobos et al., 2005). The development of quality standards of Chinese medicine has a long history. Like international medical monographs, best of Chinese medicine include many features including quantitative and qualitative analysis of samples. Special details include; Origin (e.g. Variety, part used, harvest, growing area and function), morphological group, identification e.g. features of microscopic, physical and chemical identity, moisture content, overall ash, heavy metals, reagent and active substances and bioassays, special operating procedures, general use, indications, precautions, administration and dosage. There are many medicinal ingredients in a plant and natural formula. The study of natural treatments or

combinations is helpful in achieving good results. Prescribed products may indicate effectiveness of Chinese medicine to some extent or may affect the specific effectiveness or safety of Chinese medicine (He et al., 2014).

HERBAL PRACTITIONERS

Practitioners use acupuncture techniques to treat ailments. Due to widespread use of acupuncture, patients consult acupuncturists for various ailments. Well-trained practitioners are expected to be closely involved in referring patients to acupuncturists. Although benefits of acupuncture have been explained, information about this process in market is far for widespread use, so practitioners need to be knowledgeable about its scientific approach. In medical practice, various methods can be used to support acupuncture points in treatment of diseases. Acupuncture is the most important technique for stimulating acupuncture points by inserting needles into acupuncture point and rotating it. Electroacupuncture is the modern practice of stimulating acupuncture points by passing electricity through needles. Transcutaneous electrical acupoint stimulation is an acupuncture technique that uses skin electrodes to deliver electricity to specific acupuncture points (Fig. 1). Moxibustion is among other treatments with a long history. It contains burnt mugwort, which is applied to pores and acupuncture points on skin to prompt blood circulation in intimate areas (Gadau et al., 2014).

Acupressure is a medical method in which practitioners apply pressure to acupuncture points using fingers, knuckles and infinity objects. Acupuncture treatment involves stimulating acupuncture points with static magnets made from permanent magnets. Acupoint injection also known as "water injection," is an intervention in which various medications, such as vitamins and herbal extracts, are injected into acupuncture points. Acupoint autohemotherapy is also a type of acupoint injection, in which patients' venous blood is injected into acupoints. Acupoints in TCM application is a treatment method in which prepared Chinese medicine patches are applied externally to acupuncture points. Since it is harmless and painless, it can also be used in children. The placement of acupoint catgut is a form of modern acupuncture treatment. It is based on the theory of acupuncture, which uses

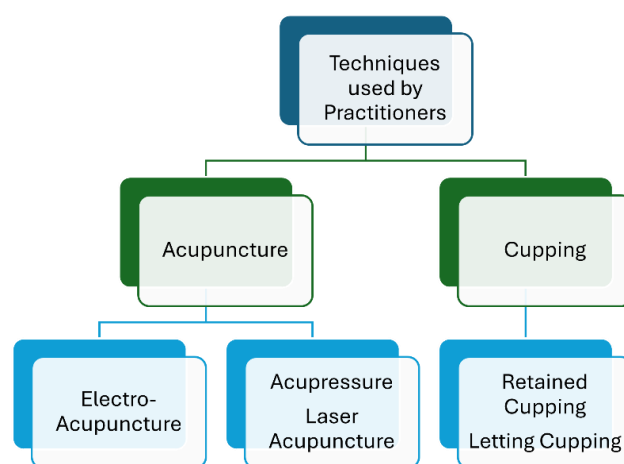


Fig 1. Traditional Chinese techniques used by practitioners

forceps to place absorbable sutures on acupuncture points (So, 2002). Laser acupuncture is based on Young's method of acupuncture, which involves photons to stimulate acupuncture points, and is used to treat different conditions (Yang et al., 2023).

Cupping is another technique used by Chinese medicine to treat diseases. Cupping therapy is a TCM treatment and has a history of thousands of years (Tham et al., 2006). It is used in conjunction with a special cup (including a bamboo cup, glass cup, or earthenware cup) placed on a favorite acupuncture point on the patient's skin to create local blockage or stop bleeding, so get foundation of cure disease. The first record of cupping was found in "Bo Shu" from the ancient tombs of Han Dynasty in 1973. There are seven major programs in China. Generally speaking, cupping practitioners use energy of flame to create absorption (negative heat) in the cup, allowing them to apply it to desired area of body. It is a technique in which the psychiatrist puts particular cups on the skin and establishes suction. This triggers the tissue below the cup to be moved up and expand by initiating expansion in blood flow to concerned area. Improved blood movement below the cups magnets impurities away from the adjacent tissues towards the surface. When the cup is withdrawn, the cup must be moved in one direction to check absorption. The first method of cupping therapy is called retained cupping and is one of the most used cupping techniques in Chinese medicine. In addition to this type of suction, there are also many types of cupping techniques including blood-letting cupping (wet cupping) and moving cupping. Needle cupping, which must apply acupuncture first, then follow the cups over the needle. Cup practitioners may also use different powers of suction including herbal (natural) cupping in which a bamboo cup is usually used. Water cup is a method that consists of one third of cups and bamboo containers with hot water and allows the cupping process to be performed faster. Each type of cupping therapy can be used for different diseases or different treatment targets (Cao et al., 2010).

QUALITY AND SAFETY RISKS MANAGEMENT IN TCM

TCM treatments have been used from thousands of years and most Chinese herbal medicines (CHMs) have no new information about their safety. This shortcoming of CHM limits its potential benefits and its acceptance and promotion in major medical applications worldwide. Moral, ethical, medical principles and management strategies used in TCM are unique to modern Western medicine, serious challenges are encountered every day to improve and standardize treatment. Today there are many issues regarding the safety of TCM products including quality, misuse, drug/herb use, impurities and toxicity. The World Health Organization (WHO) lists significant problems with implementation of TCHM products including lack of statistical data and lack of methodological standards necessary to control and regulate provision, application of medicinal and natural products. With the slow development of Chinese medicine industry and use of Chinese medicine in the world, we should make more efforts on safety of TCM, ensuring the development of this historical treatment process (Lai et al., 2013).

Challenges to the Safety

TCM is more stable than Western medicines as confirmed by previous literature, but for TCM to fulfill its role as a modern medicine, it must comply with modern safety rules. Chinese medicine is natural medicine and less toxic to human body. There is a belief that all TCM products are less risky than man-made drugs. However, some substances that affect immune system or body can also produce different side effects. Despite the potential and anticipated risks of many Chinese herbal medicines, many safety issues arise from poor management, inappropriate medications and lack of safety guidelines for administration (Qian & Lin, 2016).

Quality Standards

Quality standards have been developed for a long time in TCM. The Chinese pharmacopeia, guidelines published by the People's Republic of China's Ministry of Health, and a few regional guidelines are currently the official quality standards. Like the herbal drug standards of other nations, TCM quality standards include a wide range of topics, including quantitative analysis to differentiate between good and poor quality and qualitative identification to distinguish between authentic samples and adulterants. These comprise the following: morphological specification, identification (i.e. microscopic features, physicochemical identification, and TLC identification), moisture, total ash, acid-insoluble ash, heavy metals, residues of pesticide water-soluble or alcohol-soluble extracts, quantitative analysis (i.e. HPLC determination, quantitative TLC determination, GC assay of indicator or active ingredients, and bioassay), special processing method, traditional usage, indication, precaution, administration and dosage, storage, handling and utilization.

The selection of both qualitative and quantitative indicator components has received a lot of attention among the aforementioned test divisions. A single herb or natural compound has many different chemical components. For a single herbal remedy or herbal mixtures to achieve a certain efficacy, several elements might need to cooperate. Therefore, a single element alone could not be adequate for evaluating the quality of herbal medicines; instead, multi-component measurement would be more effective in regulating the intrinsic quality of TCMs. The identified marker components may, to some degree, indicate the effectiveness of TCMs or be connected to specific TCM activities or safety (Gao et al., 2011).

Safety Risks in Practice of TCHM

The knowledge and qualifications of medical professionals are directly related to personal safety. Safety risks recognized in practice of CHM include misdiagnosis, incorrect prescription, failure to identify and detail contraindications, irrelevant dosage and timing of medications, Lack of information about drug interactions and safety precautions associated with specific medications. There may be two reasons for inappropriate practices; Lack of supervision and inadequate education/training. According to World Health Organization (WHO) reporting from 125 member countries, up to 43.5% of traditional healers were unregulated in 2012;

56% of medical practitioners were not University degree education. To prevent safety problems arising from use and correct application, it is necessary to focus on improving training standards and strengthening control of TCM practitioners. For patient guidance it is recommended that doctors and licensed pharmacists who are knowledgeable about safety of TCM are preferred in China. In China all TCM practitioners are required to study TCM and obtain a TCM degree before they can legally register and practice. All Chinese medicine practitioners are regulated by State drug administration. Some countries including United States have laws regarding certain TCM treatments such as acupuncture. In 2012, Australia became first Western country in the world to register TCM. All TCM practitioners must be registered with TCM Board of Australia under International Registration and Accreditation Program to practice. They need information about toxicities and limitations of herbal medicines to reduce safety risks of prescribing Chinese medicine in Australia. Since many Western countries have not yet begun to regulate practitioners of TCM, World Health Organization (WHO) is incorporating this topic into its Medical Policy 2014-2023 along with key strategies and actions to promote safe use of TCM by practitioners globally (Zhang et al., 2012).

Good Quality Control

The clinical efficacy is largely dependent on the standard of TCM and their formulations. The modernization of TCM today revolves around standardization. Chinese scientists have made significant strides in the field of TCM quality control (QC) during the past few decades, and QC has significantly improved as a result. There are still many problems with the current quality standards; for example, it is impossible to accurately assess the quality of TCM (Zhang et al., 2018). A good review by Ernst (2022) collected data from 6 cases of TCM herbal medicine; This showed that impurities in TCM products appeared in 18 adverse reactions detected in Chinese medicine, including 2 adverse reactions and 4 cases with infection detected by chemical characteristics. Failure to monitor and control impurities in TCM posed health risks presented in a summary of 26 well-documented reviews and carefully evaluated the evidence for impurities in TCM. Chinese herbs are often contaminated by soil, pollen, insects, rodents, bacteria, viruses, fungi, mold, toxins, pesticides and heavy metals. The most severe problems caused due to the contamination of Chinese herbs may include agranulopenia, cerebrospinal meningitis, multiple organ failure, stroke, arsenic, lead and mercury poisoning, malignancy and cancer, hepatic encephalopathy, nephrotoxicity and metabolic acidosis, kidney and liver failure, brain edema. Different countries laws regarding Chinese herbal medicine may also affect risks associated with Chinese herbal medicine. China, South Korea, Japan and other countries, all have requirements to regulate CHM according to customary practices and international standards. Many Western countries have also followed rules of food, meal dietary supplements and medicines without paying special attention to Chinese medicine. Whether these policies will reduce risk associated with CHM has not yet been determined (Wu et al., 2018). Quality control in CHM emphasizes on confirming the validity, transparency, effectiveness, and security of herbal constituents. This involves several steps, commencing supply

control and development procedures to manufacturing procedures and testing. It aims to avoid contamination, confirms stable quality, and defend users from dangerous ingredients.

Traditional Chinese Medicine Education

The oldest University of Chinese medicine is Nanjing University of Traditional Chinese medicine whose predecessor was the Jiangsu college of Traditional Chinese medicine founded in 1954. According to 2013 data from the State Administration of Chinese medicine in China, there are 45 Chinese medicine schools and 215 other schools offering Chinese medicine programs/majors, Chinese medicine, acupuncture, massage. There are also TCM related and medical specializations/majors including Healthcare management, English, medicine and Nursing. Because Chinese medicine education has been established for many years, the level of education has continued to improve, and “development of new silks” has continued. Take Beijing University of Chinese medicine as an example. The university launched “Traditional Chinese Medicine Education Reform Experiment” in 2007. After registering, students are matched with various teachers, Father-son internship and school education together. In 2012, the new “Traditional Chinese Medicine Education Model” was completed. It includes following courses; Doctor of Traditional Chinese medicine, Doctor of Traditional Chinese and Western Medicine, “Jinghua Master-Apprentice Training for Doctor of Traditional Chinese medicine” and “Acupuncture and Massage practitioner”. These programs all adopt “five plus three” teaching method and lasts five years. Graduates of these programs receive a Bachelor of Medicine and a Master of Clinical Medicine. In 2015, Beijing University of Chinese Medicine announced a new educational model to attract non-TCM professionals, Combination of domestic and international training. “Best Chinese Pharmacist Training” is a new program that includes 6 years of training bachelor’s and master’s degrees in pharmacy. Its aim to train workers in TCM and clinical medicine skills (Xue et al., 2015).

EXAMPLES OF TRADITIONAL CHINESE MEDICINAL PLANTS

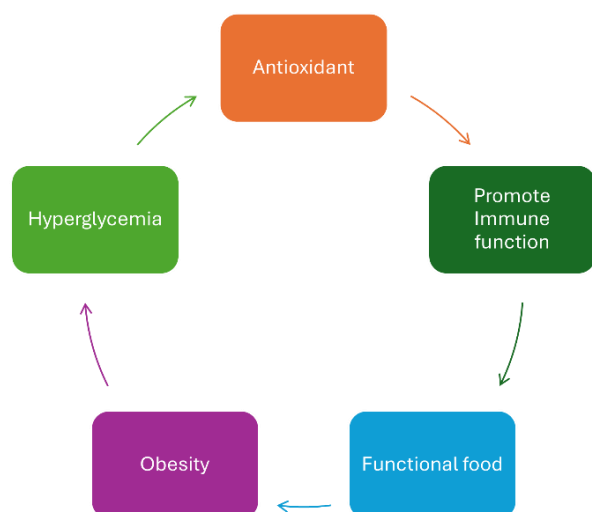
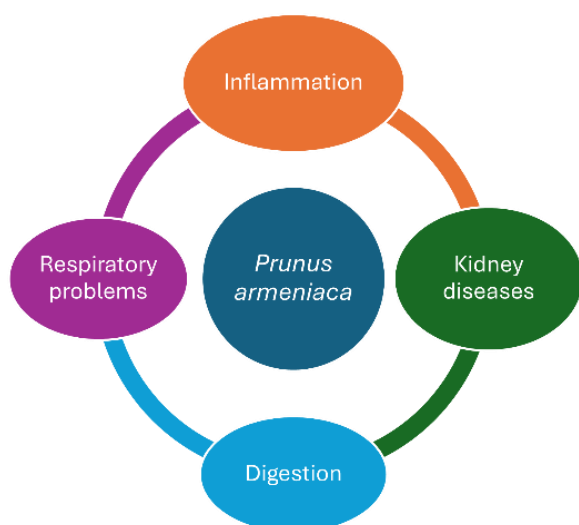
Plant resources are high in China. About 10% of approximately 300,000 species of higher plants on this earth are studied in China. For thousands of years, Chinese people have uses herbs to treat illnesses, like people in many other countries. Different plant portions from various TCM herbs were selected for quorum-sensing inhibitors (QSI). In the far eastern region, traditional Chinese herbs have been used to treat a variety of illnesses (Table 1). Research studies on TCM have mostly focused on the ways that it works in treating conditions like diabetes, hepatitis, pneumonia, hypertension and other conditions (Yang et al., 2016). The following are the different plants used in TCM.

Polygonatum odoratum

Polygonatum odoratum is a plant that can be used for medicinal and alternative uses (Fig.2). Its rhizomes are used in TCM, and they are also used as vegetables, foods, dietary

Table 1. Summary of traditional Chinese medicinal plants used for the treatment of different disorders

Species (Family)	Common Name (Chinese)	Plant Part	Medicinal Uses	References
<i>Polygonatum odoratum</i> (Liliaceae)	Solomon's Seal	Underground stem	It is used to treat fever, cough, cold, sore throat and rheumatic etc.	Zhao et al., 2018
<i>Prunus armeniaca</i> (Rosaceae)	Common Apricot (Bei Xing)	Kernel of seed	It is used to treat cold, cough, bronchial asthma and constipation etc.	Yan et al., 2020
<i>Prunella vulgaris</i> (Labiatae)	Heal-all (Xia Ku Cao)	Whole Plant	Used in the treatment of fever, tuberculosis of lymph nodes, headache, eyes pain or inflammation and fainting etc.	Rasool & Ganai, 2013
<i>Nelumbo nucifera</i> (Nymphaeaceae)	Lotus (Lian Ye)	Leaves	Used in treatment of cold, diarrhea, stomachache, fever, fainting and blood vomiting etc.	Paudel & Panth, 2015
<i>Lycium chinense</i> (Solanaceae)	Chinese Wolfberry (Gou Qi)	Fruit	It is used to treat anemia, back pain, vision problems, chronic cough, circulation and fainting etc.	Lei et al., 2022
<i>Panax notoginseng</i> (Araliaceae)	Notoginseng (Tian Qi Hua)	Flower	It is used to treat pain, inflammation, heart disease and trauma both internal and external bleeding due to injuries	Wang et al., 2016
<i>Punica granatum</i> (Punicaceae)	Pomegranate (Shi Liu Gen)	Bark	It is used in treatment of male infertility, diarrhea, ulcer, sore throat, cancer, diabetes and nose bleeding.	Maphetu et al., 2022
<i>Areca catechu</i> (Palmae)	Betel Nut (Bing Lang)	Seed	It is used in treatment of diarrhea, hypotension, anemia, obesity, urinary disorders, obesity, anorexia and glaucoma.	Ansari et al., 2021
<i>Imperata cylindrica</i> (Gramineae)	Lalang (Bai Mao Gen)	Underground stem	Used to treat hematuria, jaundice, asthma, hemorrhage, reducing fever, vomiting and edema.	Jung & Shin, 2021
<i>Barbadensis miller</i> (Asphodelaceae)	Aloe Vera (Lu Hui)	Mucilaginous gel	Used to treat burn wounds, mild fever, gastrointestinal disorders, diabetes and immune modulation.	Manvitha & Bidya, 2014

**Fig 2.** Uses of *Polygonatum odoratum***Fig 3.** Uses of *Prunus americana*

supplements and tea in China for prevention and treatment of metabolic diseases such as hyperlipidemia, hyperglycemia, obesity and heart disease. These practices have a history of more than 2000 years, and they are termed for their precise efficacy and lack of harmful side effects (Zhao et al., 2018).

Prunella vulgaris

The dried fruit of *Prunella vulgaris*, a plant from the *Lamiaceae* family, is an annual herb with a long history of culinary and medicinal properties. *Prunella vulgaris* taste bitter, pungent and cold. It reduces swelling, cleansing the liver, relieving fever and improving eyesight in many diseases such as photophobia, fainting, scrofula, goiter and cancer (Pan et al., 2022).

Nelumbo nucifera

Nelumbonaceae is a family of aquatic plants that includes the genus *Nelumbo nucifera*. This perennial plant is known by many names including Chinese lotus, Indian lotus and water lily. It is used as a natural remedy for gastritis, diarrhea, fever, insomnia and lack of body heat. It is also used as homeostatic agent in China, India and South Korea. Tea made by dried leaves and flowers of *Nucifera* is thought to have health benefits (Bishayee et al., 2022).

Prunus armeniaca

Prunus armeniaca commonly known as apricot tree, many parts of the apricot tree are used in the treatment of many conditions such as antibacterial, anti-inflammatory, hepatoprotective and anti-cancer (Fig. 3). Apricots are rich in dietary fiber, protein, carbohydrates, fatty acids, micronutrients, volatile compounds and phenolics (Kitic et al., 2022).

CONCLUSION

Chinese medicine has been used to prevent, diagnosis and treat diseases for thousands of years. It is based on the concept of “qi” (body energy) moving along meridians in body. Chinese medicine has fewer side effects than other medicines. There is a movement in Chinese pharmaceutical industry to have small factories producing Chinese herbal products that comply with international quality standards such as Good Manufacturing Practices (GMPs); but the drug process is not legal so far need. Traditional Chinese drugs and its products are widely used in China and sold in many parts of World. Practitioners in China use acupuncture and cupping techniques used to treat pain and diseases. The world Health Organization (WHO) has outlined key problems with validity of traditional Chinese Medicine products, including a lack of statistical data and a lack of presentation, medicine use claim, and due process for management and control of natural products. About 10% of the approximately 300,000 species of higher plants have been studied in China. The Chinese, like people in many other countries, have been using herbs to treat diseases for thousands of years. *Polygonatum odorata*, *Mountain apricot*, *Prunella vulgaris*, *Nelumbo nucifera* and *Lycium Chinense* are medicinal plants used to treat fever, cough, sore throat, diarrhea and dysentery.

REFERENCES

- Ansari A, T Mahmood, P Bagga et al., 2021. *Areca catechu*: A phytopharmacological legwork. Food Frontiers 2:163-83. <https://doi.org/10.1002/fft.2.70>
- Bishayee A, PA Patel, P Sharma et al., 2022. Lotus (*Nelumbo nucifera* Gaertn.) and its bioactive phytochemicals: A tribute to cancer prevention and intervention. Cancers 14:529. <https://doi.org/10.3390/cancers14030529>
- Cao H, M Han, X Li et al., 2010. Clinical research evidence of cupping therapy in China: A systematic literature review. BMC Complementary and Alternative Medicine 10:70. <https://doi.org/10.1186/1472-6882-10-70>
- Chan K, XY Hu, V Razmovski-Naumovski et al., 2015. Challenges and opportunities of integrating traditional Chinese medicine into mainstream medicine: A review of the current situation. European Journal of Integrative Medicine 7:67-75. <https://doi.org/10.1016/j.eujim.2014.12.006>
- Choe S, S Jeong, M Jang et al., 2020. Identification of phytolaccosides in biological samples from pokeweed intoxication patients using liquid chromatography-tandem mass spectrometry. Journal of Chromatography B. 1149:122123. <https://doi.org/10.1016/j.jchromb.2020.122123>
- Dobos GJ, L Tan, MH Cohen et al., 2005. Are national quality standards for traditional Chinese herbal medicine sufficient?: Current governmental regulations for traditional Chinese herbal medicine in certain Western countries and China as the Eastern origin country. Complementary Therapies in Medicine 13:183-90. <https://doi.org/10.1016/j.ctim.2005.06.004>
- Gadam M, WF Yeung, H Liu et al., 2014. Acupuncture and moxibustion for lateral elbow pain: a systematic review of randomized controlled trials. BMC Complementary and Alternative Medicine 14:136. <https://doi.org/10.1186/1472-6882-14-136>
- Gao H, Z Wang, Y Li et al., 2011. Overview of the quality standard research of traditional Chinese medicine. Frontiers of Medicine 5:195-202. <https://doi.org/10.1007/s11684-011-0134-x>
- He TT, H Hu & YT Wang, 2014. From low tech to modern industry: A study of traditional Chinese medicine sector in Guangdong, China. Journal of Science & Technology Policy Management 5:247-64. <https://doi.org/10.1108/JSTPM-06-2014-0028>
- Jin Y, X Ren & L Yu, 2021. Artificial intelligence for the development and implementation guidelines for traditional Chinese medicine and integrated traditional Chinese and western medicine. TMR Modern Herbal Medicine 4:15-28. <https://doi.org/10.53388/MHM2021B0219001>
- Jung YK & D Shin, 2021. *Imperata cylindrica*: A review of phytochemistry, pharmacology, and industrial applications. Molecules 26:1454. <https://doi.org/10.3390/molecules26051454>
- Keji C & XU Hao, 2003. The integration of traditional Chinese medicine and Western medicine. European Review 11:225-35. <https://doi.org/10.1017/S106279870300022X>
- Kitic D, B Miladinovic, M Randjelovic et al., 2022. Anticancer potential and other pharmacological properties of *Prunus armeniaca* L.: an updated overview. Plants 11:1885. <https://doi.org/10.3390/plants11141885>
- Lai JN, JL Tang & JD Wang, 2013. Observational studies on evaluating the safety and adverse effects of traditional Chinese medicine. Evidence-Based Complementary and Alternative Medicine 2013:697893. <https://doi.org/10.1155/2013/697893>
- Lei Z, X Chen, F Cao et al., 2022. Phytochemicals and bioactivities of Goji (*Lycium barbarum* L. and *Lycium chinense* Mill.) leaves and their potential applications in the food industry: A review. International Journal of Food Science & Technology 57:1451-61. <https://doi.org/10.1111/ijfs.15507>
- Liu M, Y Gao, Y Yuan et al., 2020. Efficacy and safety of integrated traditional Chinese and western medicine for corona virus disease 2019 (COVID-19): A systematic review and meta-analysis. Pharmacological Research 158:104896. <https://doi.org/10.1016/j.phrs.2020.104896>
- Ma KW, 2000. Acupuncture: its place in the history of Chinese medicine. Acupuncture in Medicine 18:88-99. <https://doi.org/10.1136/aim.18.2.88>
- Manvitha K & B Bidya, 2014. Aloe vera: a wonder plant its history, cultivation and medicinal uses. Journal of Pharmacognosy and Phytochemistry 2:85-8.
- Maphetu N, JO Unuofin, NP Masuku et al., 2022. Medicinal uses, pharmacological activities, phytochemistry, and the molecular mechanisms of *Punica granatum* L. (pomegranate) plant extracts: A review. Biomedicine & Pharmacotherapy 153:113256. <https://doi.org/10.1016/j.biopha.2022.113256>
- Newman DJ, 2020. Modern traditional Chinese medicine: identifying, defining and usage of TCM components. Advances in Pharmacology 87:113-58. <https://doi.org/10.1016/bs.apha.2019.07.001>
- Pan J, H Wang & Y Chen, 2022. *Prunella vulgaris* L.- a review of its ethnopharmacology, phytochemistry, quality control and pharmacological effects. Frontiers in Pharmacology 13:903171. <https://doi.org/10.3389/fphar.2022.903171>
- Paudel KR & N Panth, 2015. Phytochemical profile and biological activity of *Nelumbo nucifera*. Evidence-Based Complementary and Alternative Medicine 2015:789124. <https://doi.org/10.1155/2015/789124>
- Qian Q & P Lin, 2016. Safety risk management of underground engineering in China: Progress, challenges and strategies. Journal of Rock Mechanics and Geotechnical Engineering 8:423-42. <https://doi.org/10.1016/j.jrmge.2016.04.001>
- Rasool R & BA Ganai, 2013. *Prunella vulgaris* L.: A literature review on its therapeutic potentials. Pharmacologia 4:441-48. <https://doi.org/10.5567/pharmacologia.2013.441.448>
- Shi T, L Wu, W Ma et al., 2020. Nonalcoholic fatty liver disease: pathogenesis and treatment in traditional Chinese medicine and western medicine. Evidence-Based Complementary and Alternative Medicine 2020:8749564. <https://doi.org/10.1155/2020/8749564>
- So DW, 2002. Acupuncture outcomes, expectations, patient-provider relationship, and the placebo effect: Implications for health promotion. American Journal of Public Health 92:1662-7. <https://doi.org/10.2105/AJPH.92.10.1662>
- Tham LM, HP Lee & C Lu, 2006. Cupping: from a biomechanical perspective. Journal of Biomechanics 39:2183-93. <https://doi.org/10.1016/j.jbiomech.2005.06.027>
- Wang T, R Guo, G Zhou et al., 2016. Traditional uses, botany, phytochemistry, pharmacology and toxicology of *Panax notoginseng* (Burk.) FH Chen: a review. Journal of Ethnopharmacology 188:234-58. <https://doi.org/10.1016/j.jep.2016.05.005>
- Wu X, H Zhang, S Fan et al., 2018. Quality markers based on biological activity: a new strategy for the quality control of traditional Chinese medicine. Phytomedicine 44:103-8. <https://doi.org/10.1016/j.phymed.2018.01.016>
- Xue P, T Zhan, G Yang et al., 2015. Comparison of Chinese medicine higher education programs in China and five Western countries. Journal of Traditional Chinese Medical Sciences 2:227-34. <https://doi.org/10.1016/j.jtcms.2016.01.010>
- Yan S, Y Yue, L Su et al., 2020. Development of electrochemical oscillation method for identification of *Prunus persica*, *Prunus davidiana*, and *Prunus armeniaca* Nuts. Frontiers in Chemistry 8:748. <https://doi.org/10.3389/fchem.2020.00748>
- Yang HH, YC Chung, PP Szeto et al., 2023. Laser acupuncture combined with auricular acupressure improves low-back pain and quality of life in nurses: A randomized controlled trial. Journal of Integrative Medicine 21:26-33. <https://doi.org/10.1016/j.joim.2022.10.004>

- Yang L, C Yang, C Li et al., 2016. Recent advances in biosynthesis of bioactive compounds in traditional Chinese medicinal plants. *Science Bulletin* 61:3-17. <https://doi.org/10.1007/s11434-015-0929-2>
- Yin Q, JF Wang, HC Cheng et al., 2024. Yin-Yang balance concepts for clinical diagnosis and treatment: An integrated view of chinese medicine, anesthesiology, and quantum mechanics. *Transl Perioper Pain Medicine* 11:560-73. <https://doi.org/10.31480/2330-4871/182>
- Zhang L, J Yan, X Liu et al., 2012. Pharmacovigilance practice and risk control of traditional Chinese medicine drugs in China: Current status and future perspective. *Journal of Ethnopharmacology* 140:519-25. <https://doi.org/10.1016/j.jep.2012.01.058>
- Zhang T, G Bai, Y Han et al., 2018. The method of quality marker research and quality evaluation of traditional Chinese medicine based on drug properties and effect characteristics. *Phytomedicine* 44:204-11. <https://doi.org/10.1016/j.phymed.2018.02.009>
- Zhao P, C Zhao, X Li et al., 2018. The genus *Polygonatum*: A review of ethnopharmacology, phytochemistry and pharmacology. *Journal of Ethnopharmacology* 214:274-91. <https://doi.org/10.1016/j.jep.2017.12.006>
- Zhou P, H Critchley, Y Nagai, 2022. Divergent conceptualization of embodied emotions in the English and Chinese languages. *Brain Sciences* 12:911. <https://doi.org/10.3390/brainsci12070911>