

# ***Ephedra sinica* in the practice of Traditional Chinese Medicine (TCM)**

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## **Introduction to TCM**

In order to understand the nature of *Ephedra sinica*'s (Ma Huang) use in traditional Chinese medicine (TCM), one must first become familiar with a conceptual understanding of TCM theory and techniques. TCM is a system with its own rich tradition and sizable collection of data from over 3,000 years of continuous use and refinement through observation, testing, and critical thinking. TCM can be characterized as holistic, with strong emphasis on the integrity of the human body as well as the intimate relationship between humans and their social and natural environment. It primarily focuses on health maintenance and the early stages of disease with emphasis on enhancing the body's own resistance to disease. As a system of medical principles and treatments, TCM encompasses most practices classified as CAM that include herbal medicine, acupuncture, and Tai Chi/Qi Gong in the U.S. and Europe.

Chinese herbal medicine is a major part of Chinese therapeutics both in nutrition and as a form of drug therapy. The vast majority of traditional Chinese drugs (TCDs) are of botanical origin with less than 10% being of animal and mineral origin. Some TCDs are consumed as foods and are used for health promotion or treatment of diseases depending on the dose. It should be emphasized that TCDs are substances used to treat patients under the guidance of the theory of TCM and traditional Chinese pharmacology (TCP). Herbs are classified according to their characteristics, properties and actions as described by TCM and TCP. Herbs, including their active ingredients, used without appropriate diagnosis and guidance by the theory of TCM and TCP cannot be looked upon as Chinese herbal therapy. When appropriately prepared and used, TCD can be safe and effective. On the contrary, if used without proper guidance, even though herbs are less potent and less toxic than many modern medications (which are usually of pure chemical nature), a wide array of problems from minor gastrointestinal problems to major organ damage to life threatening emergencies may result. The potential for adverse interactions among herbs and especially between herbs and modern drugs is always present. In fact, practitioners of Chinese herbal medicine have for thousands of years recognized both the incompatibility and the synergistic nature of many herbal combinations. While some TCD's can be used alone for therapeutic benefit, the majority is used as part of a well-designed formula tailored to the pathophysiologic state of the patient. Modern research has helped to elucidate the pharmacological basis of some of the therapeutic effect of a number of TCDs.

## **TCM Practitioners**

- A. For acupuncturists or other interested individuals outside of California who would

like to show special expertise in Chinese herbology, eligibility criteria for examination in this area is set by the NCCAOM (National Certification Commission for Acupuncture and Oriental Medicine) and include the following:

**Formal Schooling** – graduation from a formal full-time Oriental Medical program that can document at least a three-year comprehensive curriculum consisting of a minimum of 1800 hours of entry level Oriental medical education (including 500 clinical hours and 300 hours of Chinese herbology).

**Apprenticeship** – completion of an apprenticeship of at least 4000 contact hours in a three to six year period. If the apprenticeship consist of training in Chinese herbology and another Oriental medicine discipline, at least 25 percent of the training and time must be devoted to Chinese herbology in addition to fundamental Oriental medicine theory.

**Professional practice** – practice of Chinese herbology for at least four years that includes the use of Chinese herbology with a minimum of 100 different patients and 500 patient visits per year. Practice must be at least 70 percent on general health care.

**Training include:** basic theory of TCM and western medicine. Basic theory to guide the use of herbs, herbal pharmacology and therapeutic application, toxicity and side effects of herbs, herb interaction and contraindication, herb and herb interaction, dosage and monitoring skills.

- B. The clinical practice of most acupuncturists in California usually includes the prescription of Chinese herbal medicine. The latter has been included as part of their training and licensure examination. You will find details of their training in Acupuncture Regulations, issued by the California Acupuncture Committee, July 1996. Article 3.5 – Acupuncture Training Programs: 1399.346.

In order to be approved by the committee, an acupuncture training program needs to meet the following criteria: The total number of hours of all theoretical training should consist of a minimum of 1548 hours and the total number of hours of clinical instruction should consist of a minimum of 800 hours.

128 hours on clinical sciences – a review of internal medicine, pharmacology, neurology, surgery, obstetrics/gynecology, urology, radiology, nutrition and public health.

Clinical medicine – a survey of the clinical practice of medicine, osteopathy, dentistry, psychology, nursing, chiropractic, podiatry and homeopathy to familiarize practitioners with the practices of the health care practitioners, western pharmacology.

600 hours on TCM theory and practice, acupuncture techniques, acupressure, acupuncture anatomy and physiology.

300 hours on TCM herbology including botany.

- C. Appropriate use of Chinese herbs requires proper TCM diagnosis of the Zheng (pathophysiological pattern) of the patient and the correct selection of the corresponding therapeutic strategies and principles which guide the choice of herbal formulas with the relevant herbs. In addition to extensive training in basic and clinical knowledge of TCM, graduates of accredited schools of TCM are usually exposed to modern pharmacology and medicine. However, like their counterparts in modern medicine, their knowledge of drug/disease/herb interaction remains inadequate. Nevertheless, TCM practitioners are skillful in close monitoring of patient at least through clinical examination, even though laboratory monitoring is usually not available. TCM graduates and practitioners are aware of the fact that some herbs are potentially toxic if used inappropriately and are taught how to minimize the toxicity through appropriate preparation, dosage adjustments, combination with other herbs to counteract side effects and timely tapering of these herbs when therapeutic effects are adequate.

### ***Ephedra sinica*\* in TCM**

Ephedra is a commonly used herb in Chinese medicine for thousands of years, being included as one of more than 360 herbs on the first herbal compendium written more than 2,000 years ago. Unlike commonly used herbs such as Radix Astragali, Zingiberis rhizoma, and Radix Ginseng that are used to promote health and can be part of the diet, Ephedra is in general not used by the general population for health promotion. While many herbs (tonics) and herbal formulas are frequently used to improve stamina and fight fatigue, Ephedra is not used for these purposes in TCM. TCM practitioners generally do not use Ephedra as a stimulant. In general, Ephedra is not used alone but is usually prescribed by TCM practitioners in combination with other herbs to treat different medical conditions. It has been used mainly as part of different herbal formulas to treat disorders such as cough, nasal congestion, asthma, emphysema, bronchitis, influenza, skin disorders such as ec\* zema, pain associated with arthritis, especially those types which are greatly worsened with cold and damp weather. In addition, Ephedra as part of herbal formulae, has been used to treat edematous states especially those associated with acute nephritis. It should be pointed out that in the practice of TCM, use of Ephedra's thermogenic action is not a traditional one. Ephedra is rarely used in the treatment of obesity and is not used as a major herb in such situations even if it is used as part of an herbal formulae. Because of rare occurrence of adverse effects and increasing appreciation of its multiple pharmacological effects beyond its sympathomimetic activities (anti-inflammatory, anti-anaphylactic, anti-microbial, anti-histaminic, diuretic and hypoglycemic effects), clinical applications of Ephedra have increased in modern China.

The effects of Ephedra depend not only on the dosage, but also on the nature of its preparation which is tailored to the desired effect on the patients condition as well as the selection of concomitant herbs in the formula. In general the usual dose of Ephedra is 3-9g. The toxic dose is 30-45g, though in some clinical situations, up to 30g has been used therapeutically for a short period by experienced physicians.

The following table provides examples of common herbal formulae containing Ephedra which

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\* Hereafter to be referred to simply as Ephedra.

include: 1.) Common clinical indications, 2.) Dosage range, and 3.) Concomitant herbs.

Common herbal formulae containing Ephedra:

<b>Name of formula</b>	<b>Clinical indication</b>	<b>Normal dosage (g raw herb/day)</b>	<b>Combined herbs in the formula</b>
1. Decoction for asthma (Ding Chuan Tang)	Asthma, chronic bronchitis, pulmonary emphysema	6-9	Ginkgo seed, Ephedra, perilla seed, tussilago, apricot seed, mulberry bark, scutellaria, pinellia, licorice
2. Decoction of Ephedra (Ma Huang Tang)	Common cold, asthma, cough	6-9	Ephedra, cinnamon twig, apricot seed, baked licorice
3. Decoction of Ephedra, apricot seed, gypsum and licorice (Ma Xing Shi Gan Tang)	Upper respiratory tract infection, measles, bronchitis, pneumonia	6-9	Ephedra, apricot seed, gypsum, baked licorice
4. Major Decoction of Blue dragon (Da Qing Long Tang)	Common cold, Flu, edema, cough	10-15	Ephedra, cinnamon twig, apricot seed, gypsum, baked licorice, fresh ginger, jujube
5. Minor Decoction of Blue dragon (Xiao Qing Long Tang)	Common cold, flu, asthmatic bronchitis, asthma, emphysema	6-9	Ephedra, cinnamon twig, white peony, dry ginger, asarum, schisandra, pinellia, baked licorice
6. Fang Feng Tong Sheng San	Obesity, hypertension, constipation,	3-6	Ledebouriella, schizonepeta, Ephedra, platycodon, mentha, forsythia, scutellaria, gardenia, rhubarb, gypsum, mirabilitum, talc, Chinese angelica, ligusticum, white atractylodes, white peony, licorice, fresh ginger
7. Decoction of Pueraria (Ge Gen Tang)	Headache, common cold, shoulder pain and stiff-neck	6-9	Pueraria, Ephedra, cinnamon twig, white peony, ginger, licorice, jujube
8. Decoction of Cinnamon Twing Paeonia and Anemarrhena (Gui Zhi Shao Yao Zhi Mu Tang)	Arthritis with joint pain, swollen joints, edema in legs	6-9	Cinnamon twig, white peony, anemarrhena, Ephedra, ledebouriella, white atractylodes, aconite, baked licorice, fresh ginger
9. Decoction of Ephedra, Aconite and Asarum (Ma Huang Fu Zi Xi Xin Tang)	Common cold, flu	6-9	Ephedra, aconite, asarum
10. The Stubborn Decoction with three ingredients (San Niu Tang)	Common cold, cough, asthma	6-9	Ephedra, apricot seed, licorice
11. Decoction of Belamcanda and Ephedra (She Gan Ma Huang Tang)	Asthmatic bronchitis, pulmonary emphysema, cough, asthma	6-9	Belamcanda, Ephedra, asarum, aster root, tussilago, pinellia, schisandra, fresh ginger, jujube
12. Decoction of Sichuan Aconite (Wu Tou Tang)	Arthritis (RA or OA)	6-9	Sichuan aconite, Ephedra, astragalus, white peony, baked licorice, honey
13. The Lindera Power for regulating Qi (Wu Yao Shun Qi San)	Trigeminal neuralgia, stroke, cerebral hemorrhage, syncope	6-9	Lindera, stiff silkworm, ligusticum, angelica root, Ephedra, platycodon, mature

14. Yang Activating Decoction (Yang He Tang)	Deficiency of Yang from chronic diseases of lungs, arthritis, bone related diseases	2-3	bitter orange, citrus peel, ginger, licorice Rehmannia, antler gelatin, charcoal ginger, cinnamon bark, Ephedra, brassica seed, licorice
15. Decoction for Edema (Yue Bi Tang)	Edema, arthritis	6-9	Ephedra, gypsum, fresh ginger, licorice, jujube
16. Xiao Qing Long Tang Jia Shi Gao Tang	Asthma, common cold, fever, allergies	6-9	modified from Minor decoction of blue dragon

(Ref: Him-Che Yeung, Hand Book of Chinese Herbal Formulas, The Institute of Chinese Medicine, second edition, 1995.)

It should be pointed out that the dosages listed above represent the dosage of raw Ephedra used in herbal decoctions. Besides being available as raw herbs, Ephedra containing formula may be available also as raw herb capsules, raw herb tablets, freeze-dried herbs, and standardized extracts. Dosage may vary with these other preparations.

In terms of frequency of use per day, in general, the dosage for the whole day may be taken once or divided into twice a day. The duration of therapy for different indications may vary. But in general, it is for short-term treatments. When patients improve with the disappearance of symptoms, the herbal formula is adjusted and herbs such as Ephedra would usually be stopped while other herbs of less potent nature will be used.

In terms of contraindications, Ephedra is used only for appropriate indications listed above. Because it is perceived as a warm herb (which may relate to its sympathomimetic effects) the herb in general is avoided in clinical situations of warm nature which is commonly seen in patients with hypertension, seizure, diabetes, thyroid disease, cardiac disease and certain emotional disorders. Generally, the toxic effects of Ephedra can usually be minimized by 1.) avoidance of its use on patients with certain defined patterns (pathophysiological status) in TCM, 2.) use of other herbs to modulate its side effects, 3.) special preparation, 4.) dose adjustment, 5.) limiting duration of therapy-stopping it when desired symptoms disappear. Because of the potent diaphoretic of Ephedra, it is usually contraindicated in patients who may be dehydrated.

In terms of interaction of Ephedra with other substances, Ephedra used with other herbs as part of a formula for synergistic effects are well described above. Of the eighty papers published in China since 1990 on Ephedra, most address clinical investigations of Ephedra formulas; almost none report adverse events with Ephedra. Some papers discuss the pros and cons of combining Ephedra with western medications. In cases when Ephedra is used with antihistamine such as Chlorpheniramine maleate, the effect is said to have beneficial synergistic effects. On the other hand, use of Ephedra and Ephedra containing products is recommended to be avoided in patients taking medications with MAOI activities. Furthermore, these papers recommend Ephedra not to be used concomitantly with anti-hypertensive agents, Digitalis and ionotropics, aminophylline, as well as antibiotics such as tetracycline, erythromycin and sulfonamide. In addition, from a

TCM perspective, because Ephedra is perceived to be a warm herb, it is recommended not to be used with anticholinergic agents as well as anabolic steroids to avoid development of dry throat and hoarseness.

According to Professor Ningsheng Wang, (Vice President of Guangzhou University of Traditional Chinese Medicine, Professor of Clinical Pharmacology and Chairperson of a recent W.H.O. sponsored conference on Chinese herbal medicine toxicity on September 1999), in close to 20 years of data on herbal adverse reactions in China, there were only 2 reported cases of possible adverse reactions to formulas containing Ephedra during treatment of asthma. Presenting symptoms include profuse sweating, increased bronchospasm, anorexia, bluish lips and cold extremities. Causal relationship of these cases, however, were not established. Furthermore, major herbal companies supplying Chinese herbal formulas to TCM practitioners have stated that they have not received any side effects reports by their customers on products containing Ephedra.

### **Conclusion:**

*Ephedra sinica* (Ma Huang) in combination with other herbs have been used safely and effectively in TCM for thousands of years for multiple indications such as cough, nasal congestion, asthma, emphysema, and bronchitis. With appropriate use and selection of the right dosage, concomitant herbs, preparation and duration, avoidance of their use in certain disease and pathophysiological patterns, and careful monitoring by well-trained practitioners experienced in their use, Ephedra has an important role in therapeutics. However, when it is used inappropriately, especially without careful supervision and monitoring, significant adverse outcomes can occur. Removing this useful herb from the market deprives TCM practitioners of an important tool of their therapeutic armamentarium. What is needed is better education of its users, appropriate labeling, self-policing by the profession and the industry, as well as reasonable regulation by responsible government agencies.