Medicinal herbs of Latin America 4

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INTRODUCTION

The diversity of plant species in Latin America is one the richest in the world. The Amazon rainforest alone has an estimated 75 000 types of trees and 150 000 species of higher plants per square kilometer, with more than 20% of the world's biodiversity located in Brazil alone[1]. Despite this great variety of flora, only a small fraction of Latin America's plant species has been tested for potential medicinal properties. From Mexico to Chile, native societies have a long history of using many of these plants to cure or relieve their ailments. Much of this knowledge has been adopted by modern Latin American societies, nevertheless, few have been reviewed in publications. In 1998, none of the 13 best-selling medicinal herbs in the US were indigenous to Latin America[2].

Latin American medicinal plants such as maca and cat's claw may be commonly used in their countries of origin, but their popularity cannot measure up to the fame of valerian root, ginseng, and other medicinal plants from Europe, Asia, and North America.

Latin America holds great potential as an important source of medicinal plants, both in spreading knowledge of medicinal plants currently in use and in discovering new phytochemicals. Herbalists will find it rewarding to learn more about the herbal medicine indigenous to this region of the world. This chapter discusses four commonly used medicinal plants of Latin America.

MACA (*Lepidium meyenii*)

Common names: pepper grass, pepper weed; Peruvian ginseng; mace (Spanish name)

Background

Maca is an Andean crop which is restricted to a very small area. It is found only in the central sierra of Peru at an elevation above 13 000 feet. The low temperatures and strong winds that exist in this area make survival impossible for most plant life. The edible portions of this biennial herbaceous plant are the hypocotyls found beneath the earth. It is widely recognized for its nutritional value, partly due to its high levels of various proteins and minerals.

Uses

Maca has been advocated as an aphrodisiac and for its ability to increase fertility by improving sperm morphology and concentration[3,4]. There is also evidence that Maca is able to act as an aphrodisiac by increasing sexual performance in animals[5]. Although there are data that do not support the ability of maca to increase levels of testosterone[6], claims have been made that it is able to increase sexual desire by elevating serum testosterone levels[7].

In a recent study, the administration of aqueous extract of maca to adult female mice increased the litter size. Moreover, this treatment also increased the uterine weight in ovariectomized animals. This study provides for the first time experimental evidence for some of the traditional uses of maca to enhance female fertility[8].

Phytochemistry and pharmacology

Maca extract contains many compounds, not all of which have been characterized. Identified compounds include fatty acids, alkaloids, free sugars, amino acids, sterols, glucosinolates, isothiocyanate, uridine, and malic acid. Compounds unique to maca include macaene, macamide, and macaridine[9].

The high calcium (258 mg) and iron content (15.4 mg) per 100 g are one of the main advantages of this Andean crop. It has a 14% protein and 78% carbohydrate content and is also rich in starch, glucosides, alkaloids and tannins. The protein content may vary

between 10 and 14% depending on the variety, soil conditions, and amount of sunlight[10].

Some possible mechanisms through which maca may act include increased uterine receptivity, altered immune function, and effects on the vascular system. It is probable that the main effects of maca in increasing uterine weight and litter size are due to a progestin-like rather than an estrogenic effect but to one, since maca chemical composition includes other sterols besides phytoestrogen sitosterol[8]. Maca increases the lengths of stages VII and VIII in the spermatogenic cycle. Spermiation may promote the progression of round spermatids through the elongation phase of spermiogenesis. It is possible that spermiation may provide positive signals to the Sertoli cell to continue with spermiogenesis[11].

Safety

The oral use of maca is generally safe. In a clinical trial that indicated treatment with Maca improved sexual desire, patients safely consumed 3000 mg of maca per day[6].

Preparations and dosage

In brief, the dried hypocotyls were pulverized and boiled for 30 min. The preparation was left standing to cool and then filtered. Treatment of filtrate produced a maca concentration of 333 mg/ml, this was placed in small vials and kept in a refrigerator at 4°C until use[11].

CAT'S CLAW (*Uncaria tomentosa*)

Common names: Uña de Gato (Spanish name).

Background

Cat's claw is a woody vine, containing a clear watery sap, with hooked thorns that resemble feline claws. It grows wild in the upper Amazon region of Peru and surrounding countries, and can reach several inches in diameter and 1000 feet in height. Peruvian shamans and natural healers have traditionally prepared medicinal teas by using the inner bark of the vine[1].

Uses

Cat's claw is primarily used to treat inflammation and provide pain relief. There have recently been many studies which provide evidence that cat's claw is effective for both of these uses[12,13]. It has also been advocated for cancer[14], osteoarthritis[15], enhancing the immune system[16], shortage of white blood cells[17], and rheumatoid arthritis[18].

Whether cat's claw can be effective in treating HIV patients is under active investigation; although results are mixed, the ability of cat's claw to increase the number of white blood cells[17] and enhance the immune system[16] shows that it has promise.

Phytochemistry and pharmacology

Cat's claw contains a cornucopia of active compounds. Quinovic acid glycosides found in the bark and roots of the plant have been documented to be the most potent anti-inflammatory constituents[19]. It is suggested that cat's claw is better at relieving swelling than indomethacin (indocin), a standard NSAID. However, while other reports support an anti-inflammatory role for the oxindole alkaloids[20], this is disputed by a recent study which suggests that the presence of oxindole or pentacyclic alkaloids does not influence the antioxidant and anti-inflammatory properties of cat's claw[21].

The ability of cat's claw to increase the number of lymphocytes is most likely not due to increased production, because water extracts of the plant (C-Med 100) had no significant effect on precursor cells nor on the accumulation of recent thymic emigrants in the spleen. The accumulation is most likely due to prolonged cell survival, because adoptive transfer experiments demonstrated that the active components of cat's claw significantly prolonged lymphocyte survival in peripheral lymphoid organs[17].

Cat's claw has been known to exhibit cytoprotective properties by inhibiting TNFa. The proposed pathway is via inhibition of the transcription factor NF-kB[22]. Although the main active ingredients are not known, the anti-inflammatory activity of cat's claw may be due to multiple secondary metabolites working in synergy[23].

Safety

Due to potential immune stimulation, cat's claw should not be used in patients scheduled for organ transplants or skin grafts, or during immunosuppressive therapy. Long-term use should be avoided in patients with autoimmune disorders until further information is available.

Preparations and dosage

In a study of patients with osteoarthritis, 100 mg per day of a freeze-dried preparation was used. Cat's claw tea is

prepared from ? teaspoon or 1 g of root bark by adding 1 cup of water and boiling for 10 to 15 min. Cool, strain, and drink one cup three times per day. Alternatively, $^1/_4$–$^1/_2$ teaspoon of tincture can be taken up to twice per day, or 20–60 mg of a dried standardized extract can be taken once per day[24].

GUARANA (*Paullinia cupana*)

Common names: Guaraná (Portuguese name); Brazilian cocoa, Uabano (Portuguese name), Uaranzeiro (Portuguese name).

Background

Guarana is native to the central Amazonian Basin of Brazil. It has traditionally been used by indigenous tribes as a stimulant and, most recently, as an additive in Brazilian soft drinks and other commercial products[25].

Uses

Guarana has been used for many different therapeutic purposes including as a stimulant of the nervous system in times of physical or intellectual stress, antidiarrheic, diuretic, and antineuralgic; it is also known to have an antiaggregatory action[26,27]. Guarana exhibited gastroprotective properties in pretreated animals. These animals showed a significant reduction in the severity of gastric lesions and gastric ulcerations. Guarana also significantly reduced the gastric secretory volume as well as the total acidity in *H.pylori*-ligated rats[26]. Although guarana is not known to be an aphrodisiac in animal testing, it did have a relaxing effect on the corpus cavernosum[28]. It increases blood glucose levels while decreasing liver glycogen stores[29] and one of the most promising effects of guarana is its ability to increase cognitive performance[30,31].

Phytochemistry and pharmacology

Guarana extract has been found to contain methylbenzenes, cyclic monoterpene, cyclic sesquiterpene hydrocarbons, methoxyphenylpropenes, alkylphenol derivatives, caffeine, theobromine, theophyline, tannins, saponins, catechins, epicatechins, and proanthocyanidols. The alleged psychoactivity of the essential oil is presumably due to estragole and anethole[32].

Part of the revitalizing effects of guarana may be due to a possible antioxidant action. Known antioxidants found in the plant include saponins and high concentrations of tannins. The therapeutic effects of guarana may also be due to possible resistogen or adaptogen action similar to that found in ginseng[26]. The antiaggregatory action may be due to its ability to decrease platelet thromboxane synthesis[27].

Safety

Both acute and chronic consumption of guarana were found to have no toxic effects[26]. However, another study has proposed that tannins found in guarana are dietary carcinogens because they can act as antinutrients by interfering with the body's full use of protein[33]. Guarana should not be used by people with hypertension, atherosclerosis, glucose intolerance, and those who are prone to seizures[34,35].

Preparations and dosage

One report used 75 mg of a dried ethanol extract of guarana (approximately 12% caffeine) per day[31].

DRAGON'S BLOOD (*Croton lechleri*)

Common names: Sangre de Drago (Spanish name), Sangregrado (Spanish name), Calamus Draco, Draconis Resina, Sanguis draconis, Dragon's blood palm, Blume.

Background

This plant is known as dragon's blood due to its thick red sap. It is a medium-sized tree that grows throughout the Amazon as well as in some parts of Colombia, Bolivia, and Ecuador. The sap is often described as a blood-red latex and is commonly used as a household remedy in many Latin American countries, and among the Latin American population of the US. This plant is available as a dietary supplement in the United States.

Uses

Dragon's blood has been advocated for diarrhea[36,37], viral-induced diarrhea in AIDS patients[38], viruses[39], stomach ulcers[40], pain relief[40], wound healing[41], cancer [42,43], and as a highly effective antioxidant[44].

In a double-blind, randomized, placebo-controlled study among travelers to Jamaica and Mexico, an oligomeric proanthocyanidin (SP-303) extracted from the bark latex of the tree decreased the duration of acute

secretory diarrhea by 21% without causing post-treatment constipation[37].

Extracts of dragon's blood have been shown to have antiviral activity against influenza[45], parainfluenza, and the herpes simplex viruses I and II[46]. In a multi-center, double-blind, placebo-controlled study, a topical preparation of SP-303 was used to treat recurrent genital herpes lesions in patients with AIDS. Viral culture showed 50% of the treated group and 19% of the placebo-treated patients became culture-negative at the end of the 21-day trial[47].

Phytochemistry and pharmacology

Dragon's blood contains several simple phenols, diterpenes[46], proanthocyanidins, phytosterols, the lignan 3,4-*O*-dimethylcedrusin[46], and the alkaloid taspine[41]. These last two compounds have antiviral and wound healing properties that can potentially be useful in treating the viral sores caused by herpes[46].

The extract SP-303 is an effective medicine for those suffering from diarrhea because it inhibits CFTR-mediated chloride secretion which is the primary cause of diarrhea via cAMP-dependent hyperactivation of CFTR. Currently, no drug treatments are available that specifically target and block the CFTR chloride ion channel[37].

The alkaloids taspine and 3,4-*O*-dimethylcedrusin are considered to be the active principles of dragon's blood sap. They are responsible for the anticancer and anti-inflammatory activities, respectively, as well as for wound-healing properties. It has also been reported that taspine is the cytotoxic substance of dragon's blood and that it shows cytotoxicity as a plant metabolite[46]. Dragon's blood acts as an antioxidant by scavenging peroxyl and hydroxyl radicals at high concentrations.

Safety

Dragon's blood is generally safe. No drug interactions with dragon's blood have been reported. Evidence suggests that taspine is a cytotoxic constituent of dragon's blood and therefore the plant should be used in moderation[46]. Use during pregnancy or by nursing mothers is not recommended.

Preparations and dosage

The recommended dosage of the standardized extract of SP-303 is 250–500 mg, two to four times daily or as needed[37]. Recommended dosages for tinctures range from 10–30 drops up to three times daily, and for dry extracts 20–60 mg mixed in water three times daily. For sores apply externally.

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