KEY POINTS

* Herbs are non-woody plants or plant parts claimed to have medicinal, therapeutic, or performance-enhancing values. Herbs can be sold as fresh or dried products, liquid or solid extracts, tablets, capsules, powders, in drinks, in energy bars, or in tea bags.
* In the United States, herbs are not required to be standardized, so there is little consistency among different batches of products from different manufacturers. However, herbs are regulated by the U.S. Food and Drug Administration (FDA) as dietary supplements as part of the Dietary Supplement Health and Education Act (DSHEA) that became law in 1994.
* Herbs have a long history of use, especially in China. However, in most cases, double-blind, placebo-controlled human research on herb use by athletes is limited or non-existent, making it difficult to assess the value of herbs for improving athletic performance.
* Concerns over safety, side effects, and potential drug/herb interactions make it essential for athletes to discuss the use of herbal products with their health-care team.
* Accessing reputable information about herbs and performance is difficult but critical when educating athletes about potential benefits and adverse side effects of herbs.

INTRODUCTION

Athletes, coaches, and health professionals who work closely with athletes are consistently looking for sound, effective ways to enhance health and performance with foods, fluids, and dietary supplements. Herbs are non-woody plants or parts of plants that have long been valued for their medicinal or therapeutic value, especially in China. In fact, many common medications, such as aspirin, digoxin, and quinine, were first developed from herbs. Thus, herbs can act as drugs and like drugs, they also pose potential side effects or interactions with foods, other herbs, or medications. It has been estimated that in the United States, approximately five billion dollars are spent yearly on herbal products (National Center for Complementary and Alternative Medicine, 2005).

Herbs contain chemicals called phytochemicals that presumably account for any effects they may have. Among the phytochemicals thought to be the active ingredients in herbs are flavonoids, phenols, saponins, and terpenes. Many herbalists contend that it is the mixture of phytochemicals, known and unknown, in whole herbs that is responsible for their functions, and that using extracts of only one or more of those chemicals from the herb is not likely to be effective as using the whole herb.

In a recent survey of over 31,000 adults in the U.S., about one-fifth of those surveyed (19%) used natural products. From the survey, the top ten natural products used in order of popularity were: echinacea, ginseng, ginkgo biloba, garlic, glucosamine, St. John’s wort, peppermint, fish oils/omega fatty acids, ginger, and soy supplements (Barnes et al., 2004). Other surveys have found herbal supplement use to be even higher. The Natural Marketing Institute (NMI), which researches the natural products marketplace, has followed supplement use in the general population for the last six years. In their most recent review dating back to 2003, 34% of adults used herbal supplements, which represents a market of over 60 million adults.
The NMI survey also indicated that herbal supplement users were 32% more likely to buy energy and nutrition bars than the general population (National Marketing Institute, 2004).

In the United States, herbs and other nutrition supplements are regulated as dietary supplements by the U.S. Food and Drug Administration under the 1994 Dietary Supplement Health and Education Act. Herbs and other dietary supplements are not required to meet the same standards as foods and beverages. Drugs and over-the-counter medications have even higher standards for evidence of safety and effectiveness. This is an important concern for athletes because weighing the potential benefit with safety risks is essential when adding specific herbs or supplements to any nutrition plan.

This article will review what little research published in English is available on several herbs that athletes may use in hopes of improving health and/or performance. Sports-related uses include enhancing performance in prolonged endurance events, inducing muscular hypertrophy and increasing strength, decreasing body fat, speeding recovery, and improving performance in team sports (Bucci, 2000). Many athletes may use herbal products to try to aid in healing after an injury, to decrease inflammation, to manage pain, to stay more alert, and to boost immunity and optimize their chances of staying healthy in and out of season, enabling them to compete at the highest level possible.

There is insufficient research on the use of herbs by athletes to make firm recommendations, and that is not the intent of this article. Rather, this brief review provides an introduction to what little science on selected herbs is available in the English literature. Moreover, it is important to remember that some of the phytochemicals in herbs may have harmful side effects, including adverse interactions with medicines the athlete may be taking. In short, athletes should be extremely wary about ingesting herbs containing unknown amounts of unknown chemicals for unclear benefits with the possibility of harmful side effects.

**RESEARCH REVIEW**

**Arnica**

Arnica is contained in the flowers and the rhizome of the Arnica Montana plant. Arnica is also known as mountain tobacco, leopard’s bane, wolf’s bane, and wundkraut. Typically, Arnica is marketed in a gel form to be used topically with claims that doing so stimulate the immune system and minimize inflammation associated with bruises, sprains, and general aches. The anti-inflammatory effects of Arnica are thought to be mediated by helenanin, a terpene compound, which reduces edema in animals (Memorial Sloan-Kettering, 2005). Although Arnica in small amounts as a flavoring ingredient has been Generally Recognized as Safe (GRAS) by the Food and Drug Administration for use in foods in the U.S., larger amounts of this herb are not considered safe for oral consumption because Arnica can cause severe and sometimes fatal poisonings (Natural Medicines Comprehensive Database, 2005).

One trial investigated the safety and efficacy of Arnica gel versus placebo applied twice daily in 79 people with osteoarthritis of the knee. After three and six weeks, significant reductions in pain, stiffness, and function were noted in the Arnica group. The authors concluded that this topical application was a safe, well-tolerated, and effective treatment for mild-to-moderate osteoarthritis of the knee (Knuesel et al., 2002).

The only available publications in which athletes were subjects examined whether Arnica would decrease muscle soreness and cell damage after distance running. When compared to a control group of marathon runners, enzyme markers of cell damage were not affected by Arnica; muscle soreness in the Arnica group was lower immediately after the marathon, but not during the first three days of recovery, when muscle soreness is typically at its worst (Tveiten & Bruset, 2003). An earlier study of delayed-onset muscle soreness in distance runners by Vickers et al. (1998) also failed to find any benefit of Arnica compared to placebo.

Some people using topical Arnica suffer serious skin irritations (Paulsen, 2002), and some concern has been noted about Arnica’s potential to enhance the actions of anticoagulant and antiplatelet medications (Heck et al., 2000).
**Astragalus**

Astragalus (Astragalus membranaceus) is used for immune enhancement and maintaining overall health (Sinclair, 1998). Astragalus, known as huang chi, huang qi, or milk vetch, is claimed to stimulate or potentiate components of the immune system, including natural killer cell activity (Memorial Sloan-Kettering, 2005). Compounds including saponins (a glycoside found in oats, spinach, and other plants) and polysaccharides may play roles in the immune effect of astragalus.

In people with very low white blood cell counts, Astragalus may increase the white cell count and levels of interferons, keys in fighting viruses (Kurashige et al., 1999). Astragalus has also been found to enhance the activity of macrophages. Astragalus could potentially increase the tumor-killing actions of the drug, aldesleukin, but have adverse effects in patients taking immunosuppressant medications such as cyclophosphamide (Memorial Sloan-Kettering, 2005).

In one small study of 12 athletes randomly separated into herbal and placebo groups, an herbal formula using Astragalus as one of several herbal ingredients was reported to have improved endurance in athletes after eight weeks of treatment and exercise training (Chen et al., 2002). Unfortunately, this report is seriously flawed. First, the herbal dose was not specified. Second, the exercise training was not standardized; third, the main pre- and post-treatment performance test used was a Balke progressive treadmill test to exhaustion, which may or may not have any relationship to athletic performance; and fourth, only analysis-of-variance results were reported, i.e., the data for means and standard errors were not presented. Accordingly, this report adds little or nothing to scientific knowledge about Astragalus and athletic performance.

**Cayenne**

Cayenne (Capsicum frutescens, Capsicum annuum) is one of the most widely consumed spices. It is known as capsicum, red pepper, hot pepper, African chilies, and paprika. Cayenne is used orally to stimulate digestion, to treat diarrhea, cramps, and toothaches, and as a gargle for laryngitis and for muscle pain, osteoarthritis, rheumatoid arthritis, and muscle spasms. Capsaicin is the active component, and its pain-relieving effect is believed to come from its ability to interfere with sensory nerve signaling in the skin (Memorial Sloan-Kettering, 2005).

Lim et al. (1997) fed male distance runners a breakfast that included 10 grams of red pepper and then monitored their energy metabolism during 2.5 hours of rest and 1 hour of cycle ergometry at 60% VO2max. The authors reported increases in respiratory exchange ratio and blood lactate concentration both at rest and during exercise. They suggested that cayenne increases carbohydrate metabolism. If this were a reproducible effect, the value for athletic performance is unclear, especially because the performance test was conducted at a relatively low intensity, similar to that used in events lasting several hours, when an increase in the fraction of energy supplied by carbohydrate may be undesirable.

Athletes may be most interested in cayenne’s potential for relieving musculoskeletal pain. However, available research indicates that few people will experience such relief. In one review, it was noted that only one of every eight patients treated with 0.025% capsaicin achieved at least a 50% reduction in pain (Mason et al., 2004). The authors noted that capsaicin may be useful as an adjunct or sole therapy for a small number of patients who are unresponsive to, or intolerant of, other treatments.

When taken orally, cayenne can cause many gastrointestinal side effects, including abdominal discomfort and nausea. Topically, it can cause burning and stinging and be harmful if it gets in the eyes. Cayenne may interact with several medications, including theophylline, ACE inhibitors, sedatives, antihypertensives, and acetaminophen (Memorial Sloan-Kettering, 2005).

**Cordyceps**

Cordyceps (Cordyceps sinensis, Sphaeria sinensis) is a Chinese mushroom and is also known as caterpillar fungus, dong chong xai cao, semitake, and hsia ts’ao tung ch’ung. It is used for many conditions, including fatigue, respiratory disorders, sexual dysfunction, enhancing the immune system, and improving athletic performance. Preliminary studies suggest Cordyceps may stimulate immune function in several
ways, including increasing the number of T helper cells, increasing natural killer cell activity, stimulating the production of blood mononuclear cells, and prolonging the survival of lymphocytes (Natural Medicines Comprehensive Database, 2005).

There is little or no evidence that Cordyceps can impact athletic performance. In one study with 22 male endurance-trained cyclists studied for five weeks, there was no effect on aerobic capacity or endurance exercise performance in those supplemented with Cordyceps at a dose of 3 grams/day compared to the placebo group (Parcell et al., 2004). Similarly, there was no effect of 14 days of treatment with an herbal supplement containing 800 mg of Cordyceps and 300 mg of Rhodolia on VO2max or performance on a progressive cycle ergometry task (Earnest et al., 2004).

Cordyceps may reduce blood glucose levels, so blood glucose monitoring may be indicated for athletes using this herb. In addition, Cordyceps may interact with hypoglycemic medications (Memorial Sloan-Kettering, 2005).

Devil’s Claw
Devil’s claw (Harpagophytum procumbens) is a perennial herb native to South Africa, Namibia, and Botswana. It is also known as grapple plant, harpagophytum, and wood spider. It is used as a pain reliever, to improve digestion, and to manage fevers. Most recently, its use for back pain and osteoarthritis has been touted. The compound responsible for this is thought to be harpagoside, a phenylpropanoid (Memorial Sloan-Kettering, 2005). Devil’s claw seems to inhibit COX-2 and nitric oxide synthetase, a modulator of inflammation (Natural Medicines Comprehensive Database, 2005). Treatment with devil’s claw extract has been associated with a lower risk of adverse events than treatment with synthetic analgesics, and may contribute to pain relief in the majority of patients using the herb in a daily dose of at least 50 mg harpagoside (Chrubasik, 2004). Devil’s claw has been found to be well tolerated when used daily for up to 16 weeks. However, there is potential to interfere with a host of medications, including antacids, antidiabetes drugs, and antihypertensive drugs.

Echinacea
Echinacea (Echinacea purpurea, Echinacea angustifolia, Echinacea pallida) has been one of the most popular herbs in the last several years due to its purported benefit for preventing and treating the common cold and enhancing the immune system (Memorial Sloan-Kettering, 2005). Echinacea is also known as purple coneflower, black Sampson, sonnenhut, and Indian head. It has been used orally to fight a host of infections, including genital herpes (HSV Type 1 and 2), urinary tract infections, and yeast infections. Topically, it has also been used to treat other diseases, including eczema and psoriasis (Natural Medicines Comprehensive Database, 2005).

Results from studies of Echinacea’s efficacy are conflicting. In a recent review, Caruso et al. (2005) concluded that the efficacy of Echinacea as a treatment for the common cold had not been established. In one study showing positive results, a randomized, placebo-controlled evaluation of Echinacea extract administered to 80 patients at the first sign of a cold found the duration of illness was significantly shorter in the Echinacea group (6 days) vs. placebo (9 days) (Shulten et al., 2001). However, in a more recent study by Yale and Lui (2004) on 128 patients with upper respiratory infections, no significant difference was observed for cold symptoms between the Echinacea group and control group.

One difficulty with studying Echinacea is that the active constituent(s) have not been fully identified. Moreover, in a recent analysis of 59 brand-name Echinacea products, 48% did not contain the species of Echinacea printed on the label, and 10% contained no measurable Echinacea at all (Gilroy et al., 2003).

Although Echinacea is generally well-tolerated, side effects such as allergic reactions, fever, nausea, abdominal pain, and diarrhea have been reported (Memorial Sloan-Kettering, 2005). Echinacea may antagonize the effects of immunosuppressants and could interact with several medications including lovastatin, ketoconazole, and triazolam (Miller, 1998).

Elderberry
European elderberry (Sambucus nigra) has long traditional roots among herbalists. Elderberries (also known as American elder) have long been used for making preserves, wines, and flavorings. In more recent years, elderberry supplements, juices, and syrups have become popular for their flavonoid content. The primary uses for elderberry are to manage common symptoms of colds, influenza, and fever, but it is also taken for diuretic purposes (American Botanical Council, 2005). In-vitro studies have noted significant antioxidant capacity, antiviral properties, immunostimulation, and increased production of inflammatory and anti-inflammatory cytokines (American Botanical Council, 2005).

Several small studies on elderberry treatment for influenza have reported that those using elderberry preparations recovered significantly faster than patients in the control groups. In one placebo-controlled, double-blind study on 27 adults and children with influenza, patients received either Sambucol® (an elderberry syrup) or placebo daily for three days (Zakay-Rones et al., 2004). Within two days, 93.3% of those treated with elderberry had a significant improvement in symptoms, including a reduction in fever, whereas 91.7% of the placebo group showed no improvement until the sixth day. Also, a higher level of antibodies to influenza was found in patients receiving the elderberry preparation than those receiving placebo.

A review of elderberry by the American Botanical Council (2005) found no confirmed drug interactions, although potential interactions with diuretics or laxatives has been speculated. Although uncooked parts of the elderberry plant, especially the roots, can be poisonous, consumption of cooked elderberry juice is probably safe when used appropriately.

**Ginger**
Ginger (Zingiber officinale) has been touted as a treatment for depressed appetite, colic, diarrhea, drug withdrawal symptoms, indigestion, motion sickness, nausea and vomiting, and other ailments (Memorial Sloan-Kettering, 2005). Known as zingiberis rhizoma, zingiberaceae, ginger root, Jamaica ginger, and shen jiang, it is also commonly used to temper motion sickness, enhance appetite, and treat osteoarthritis. The shagaol and gingerol constituents found in the rhizome of ginger are thought to confer the anti-emetic action, as they are believed to stimulate the flow of saliva, bile, and gastric secretions (Memorial Sloan-Kettering, 2005). Many of the clinical studies on ginger that found benefits were performed on pregnant women with nausea or in patients following surgery. There is less support for ginger as a deterrent to motion sickness.

There is preliminary evidence that ginger may offer modest benefits with osteoarthritis. Two studies found ginger extract taken orally at 170 mg 3 times per day or 255 mg twice per day for 3-6 weeks modestly improved pain after standing or walking and joint stiffness in some patients (Altman & Marcussen, 2001; Marcus & Suarez-Almazor, 2001).

When used in typical doses, ginger is tolerated well. Higher doses of 5 grams per day or more increase the risk of side effects (Natural Medicines Comprehensive Database, 2005). There is potential for interactions with other herbs (i.e., garlic, ginkgo, turmeric) that could affect platelet aggregation and anticoagulants, antidiabetes drugs, and calcium channel blockers.

**Ginseng**
Ginseng is widely marketed to enhance exercise performance. The term ginseng generally refers to Panax ginseng, the species also known as Chinese ginseng or Korean ginseng. The likely active agents in ginseng roots are ginsenosides. Ginseng is marketed for many purposes that may relate to athletes, but the most common are to increase physical power, restore Qi or life energy, increase overall health, enhance immunity, and increase vitality. Ginseng has shown immunoenhancing effects in animals and humans and antioxidant activity in-vitro and in animals (Bucci, 2000).

As noted by Williams (1998), many of the advertised claims of increased energy and performance associated with ginseng supplementation are based on studies conducted in the 1960s and 1970s, with few placebo-controlled, randomized studies. Although some studies resulted in significant improvements in physical or psychomotor performance with higher doses (standardized to ginsenoside content equivalent to
>2 grams of dried root per day), at least eight weeks of study, and larger subject numbers, other investigations have failed to show improvements (Bucci, 2000). As one example, Liang et al. (2005) compared low-intensity cycling endurance performance in untrained subjects before and after they ingested capsules containing placebo or 1,350 mg of Panax notoginseng daily for 30 days. The authors concluded that the ginseng supplement, but not the placebo, improved endurance time to exhaustion. Whether or not a beneficial effect on endurance to low-intensity ergometer exercise would translate into improved athletic performance is unclear.

In a negative report, Engels et al. (2003) found no effect of Panax ginseng on performance of repeated 30-second Wingate tests, recovery heart rates, or salivary immunoglobulin.

Cabral de Oliveira et al. (2001) found reduced levels of inflammation-associated enzyme activity when Panax ginseng was administered to humans. The authors speculated that ginseng may play a role in reducing muscle injury and inflammation following exercise.

Siberian ginseng (Eleutherococcus senticosus, Acanthapanax senticosus) has also traditionally been marketed and used as a performance enhancer and immunostimulant, with active components including eleutherosides and polysaccharides. Siberian ginseng is also known as ciwuija and Russian root. In a 1996 study monitoring the use Siberian ginseng components (eleuthero extract) for 6 weeks in 20 highly-trained distance runners, no significant differences in heart rate, oxygen uptake, blood lactate concentrations, time to exhaustion on a treadmill test, or ratings of perceived exertion were noted (Dowling et al., 1996). Similar results were reported by Eschbach et al. (2000), who examined the physiological responses to supplementation with Eleutherococcus senticosus in nine trained endurance cyclists. Neither steady-state substrate utilization nor 10-km cycling performance time were enhanced with Siberian ginseng.

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Ginseng can cause digestive disorders and may interact with several medications, including monoamine oxidase inhibitors, insulin, digoxin, and anticoagulants. It may be contraindicated in those with high blood pressure (Memorial Sloan-Kettering, 2005).

Gotu Kola
Among the disorders purportedly improved by the use of Gotu kola (Centella asiatica, Hydrocotyle asiatica) are burns, cancer, circulatory disorders, gastrointestinal ailments, hypertension, memory loss, and varicose veins (Memorial Sloan-Kettering, 2005). This herb is also marketed to reduce skin inflammation, increase energy levels, and aid in recovery from injuries such as sprains and strains. The latter two purported effects may be of most interest to athletes, but no research has been published to support these claims.

Also known as Indian pennywort, hydrocotyle, and kaki kuda, gotu kola seems to reduce swelling and fluid accumulation in the legs and ankles of patients with compromised venous function (Cesarone et al., 2001). In a study of 94 patients with venous insufficiency of the lower limbs, a significant improvement in the symptoms of heaviness of the lower limbs and edema was found in those patients taking the gotu kola preparation (60 mg or 120 mg per day of titrated extract of Centella asiatica) vs. placebo (Pointel et al., 1987).

Gotu kola may also affect connective tissue by increasing collagen formation and glycosaminoglycan synthesis and decreasing inflammation (Memorial Sloan-Kettering, 2005). Most of these studies have been performed in laboratory animals.

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The triterpenoids found in gotu kola seem to be the active components involved in wound healing and decreasing venous pressure. People may confuse gotu kola with kola nut, which contains caffeine. However, gotu kola does not contain caffeine, and thus does not have stimulant properties. Gotu kola may theoretically interfere with hypoglycemic and anti-hyperlipidemic medications.

Guarana
Guarana (Paullinia cupana) is one of many herbs touted for its caffeine-like effects. Also known as guarana gum, guarana seed, zoom cocoa, and Brazilian cocoa, it is found in many “energy” supplements or “fat loss"
supplements marketed to athletes. Derived from the seed and gum from the tree, guarana is primarily marketed as an appetite suppressant, central nervous system stimulant, athletic enhancer, and energy enhancer.

Before ephedra was banned in the United States, guarana could be found teamed with ephedra as a weight loss supplement. In one 8-week trial, 67 participants were given supplements with 72 mg of ephedra and 240 mg caffeine from guarana or placebo per day. Subjects from the treatment group lost an average of 4.0 kg as compared to 0.4 kg in the placebo group (Boozer et al., 2001). However, more research is needed to confirm any claim that guarana can induce weight loss. Guarana contains 3.6% to 5.8% caffeine as compared to 1% to 2% in coffee (Natural Medicines Database, 2005). It also contains the alkaloids theophylline and theobromine, tannins, and saponins.

Side effects of using guarana are those similar to caffeine, including increased blood pressure, anxiety, headache, and cardiac stimulation. Guarana is thought to potentially interact with several types of supplements and medications, including caffeine-containing supplements, ephedra, monoamine oxidase inhibitors, adenosine, clozapine, lithium, oral contraceptives, and acetaminophen (Memorial Sloan-Kettering, 2005).

**Rhodiola**

Rhodiola (rhodiola rosea), a popular plant in traditional medicine in Eastern Europe and Asia, supposedly offers generalized resistance to physical, chemical, and biological stressors. It has been claimed to stimulate the nervous system, decrease depression, enhance work performance, eliminate fatigue, and prevent high altitude sickness. It is also marketed to improve athletic performance. Also known as golden root or Arctic root, it has been widely studied in Russia and Scandinavia for more than 35 years.

Most of the research on this herb is not published in English, but the English-language literature provides some support for its ability to help the body adapt to stress (Kelly, 2001).

In a recent study, De Bock and colleagues (2004) investigated the effects of acute and 4-week supplementation of 200-mg doses of Rhodiola rosea extract on endurance during a progressive cycling task, peak oxygen uptake during the test, muscle strength, speed of limb movement, reaction time, and attention. The authors reported that after acute ingestion of the herb, there was a significant 24-second increase in endurance for the 17-minute cycling task and a corresponding slight increase in peak oxygen uptake. There was no effect on the other variables in the acute study, and no effects on any variable, including endurance, were found when the herb was administered during the 4-week supplementation study. In another negative study, Earnest et al. (2004), who administered an herbal supplement that contained both 300 mg Rhodiola and 800 mg Cordyceps to subjects for 14 days found no effect on VO2max or endurance in a progressive bicycle ergometry task.

Rhodiola has no obvious harmful side effects, but it could potentially interact with monoamine oxidase inhibitors.

**Valerian**

Valerian (Valeriana officinalis, Valerianae radix) is used orally as a sedative-hypnotic for insomnia, sleep disorders, and anxiety, for mood disorders such as depression and attention deficit-hyperactivity disorder (ADHD), to lessen menstrual cramps, and to aid muscle and joint pain. Also called garden valerian, Indian valerian, Mexican valerian, tagara, and garden heliotrope, it contains several compounds that may provide its effects including iridoid esters, volatile oils, monoterpene, and sesquiterpene constituents.

Of interest to athletes may be valerian’s purported ability to reduce the time to sleep onset and improve sleep quality. The greatest benefit is usually seen in patients using 400-900 mg valerian extract up to two hours before bedtime for as long as 28 days (Natural Medicines Database, 2005). In a negative report, Diaper and Hindmarch (2004) studied older adults with sleep disorders and found no benefit of single doses of either 300 mg or 600 mg of valerian on sleep duration, brain activity during sleep or any psychometric measure recorded upon awakening.
Long-term use of valerian has been associated with liver pathology. Adverse reactions may include headache, uneasiness, cardiac disturbances, morning drowsiness, and impaired alertness. There are potential interactions with alcohol and with other herbs and drugs that have sedative properties.

**Willow Bark**
Athletes might use willow bark (Salix alba), also known as white willow, black willow, purple osier, and bay willow, in place of aspirin to ease aches and pains. The main active component of willow bark extract is salicin, which is converted to acetylsalicylic acid in the intestine. It is used for many purposes similar to aspirin: fever, headaches, inflammation, osteoarthritis, influenza, and muscle pain.

Biegert et al. (2004) compared willow bark equivalent to 240-mg salicin with placebo and with diclofenac (a non-steroidal anti-inflammatory drug or NSAID) during a six-week study of patients with osteoarthritis or rheumatoid arthritis; they found no difference in pain scores between placebo and willow bark, whereas the diclofenac group experienced a reduction in pain. Different results were reported by Schmid et al. (2001), who administered placebo or willow bark standardized to 240-mg salicin daily for 2 weeks to 78 patients with osteoarthritis. The authors found a decrease in joint pain in the willow bark group compared to placebo. In a four-week study of 191 patients with low back pain, more of those receiving an oral willow bark extract with either 120-mg or 240-mg salicin were pain free compared to a placebo group (Chrubasik et al., 2000).

Willow bark is contraindicated in people who have an allergy or intolerance to aspirin or non-steroidal anti-inflammatory drugs. The herb may also increase the actions of anticoagulants and NSAIDs.

**Herbs Marketed with Limited Scientific Research**
Most herbs are marketed to athletes with little or no solid data to back up the claims for improved performance, increased muscle mass, or enhanced energy on the field. One example is yohimbe, marketed to increase athletic performance. Research does not back up this claim, and there are many potential adverse reactions associated with the herb (i.e., anxiety, nervousness, dizziness, manic symptoms). Yohimbe is also thought to interact with many types of medications. The therapeutic administration of yohimbe bark and its preparations is not recommended due to insufficient proof of efficacy and the unforeseeable correlation between risk and benefit (Blumenthal, 1998, p. 383).

Another highly touted herb for athletes is puncture vine, also known as Tribulus terrestris. The idea behind the herb is that it may increase testosterone levels. However, in one of the few published studies of Tribulus in athletes, Antonio et al. (2000) found no difference between eight weeks of resistance training accompanied by placebo or herb administration on body composition, resistance exercise performance, or mood state. There is clearly insufficient reliable information available about the effectiveness of Tribulus.

**Safety and Potential Herb Interactions**
Athletes and those working closely with them must remember that herbs can be powerful tools that may be an important addition to their training. But, because of the strong compounds that can be present in herbs, knowledge of potential side effects and interactions with other herbs, medications, and foods is essential. As an example, researchers from Kansas University recently published a paper finding that guggulsterone, the active ingredient in the herb gugulipid, activates a liver enzyme that breaks down almost 60 percent of the prescription drugs on the market (Brobst et al, 2004). Researchers found that the drugs affected by guggulsterone include the AIDS drug AZT, anticancer agents, and cholesterol-lowering statins. Gugulipid herbal therapy is marketed to lower cholesterol and is available without a prescription, as an herbal product.

**SUMMARY**
Although there is insufficient high-quality research to support the claims, there are many herbs marketed to help athletes achieve their goals. Specific herbs purportedly aid in managing certain medical conditions such as insomnia (e.g., valerian), boosting caffeine stimulation (e.g., guarana), or easing joint pain (e.g., ginger or willow bark). It is claimed that some herbs, e.g., Rhodiola, directly enhance performance, whereas others, e.g., Astragalus, Cordyceps, and echinacea, supposedly improve immunity or speed recovery from...
illness. More research on herbs, health, and athletic performance is needed to better assess efficacy and safety. Until that research is forthcoming, athletes are best advised to avoid unproven herbal treatments. Sports professionals working with athletes can serve as sound resources for helping athletes find reputable and truthful information about herbs.

REFERENCES


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