Monograph

Echinacea

Introduction

The Echinacea plant is a member of the Compositae family; the three species of medicinal interest being *Echinacea angustifolia, Echinacea purpurea,* and *Echinacea pallida. Echinacea angustifolia* has been used therapeutically for centuries by Native Americans as a remedy for eye conditions, snake bites, insect stings, infected wounds, eczema, enlarged glands, mumps, and rabies. It was also used as a painkiller for a variety of conditions from stomachaches to epilepsy. In the early 20th century, Echinacea was used by a group of physicians known as the "Eclectics," whose medicinal practice relied primarily on the use of plants and their disease-healing properties. During the Eclectic era, Echinacea was used to treat a variety of kidney and urinary tract conditions, chronic bacterial infections, and syphilis.[1] From the 1930s-1970s, antibiotic development resulted in a sharp decline in Echinacea use, but due to a subsequent disenchantment with the medical establishment, an herbal medicine "renaissance" in the 1980s led to renewed interest in Echinacea's benefits. Echinacea research during the last 20 years has focused on its immune-stimulating properties. Currently, Echinacea is being used to combat bacterial, viral, protozoan, and fungal infections, as an anti-inflammatory agent, and as a possible chemopreventative agent.

Description and Constituents

Echinacea is also known as purple coneflower, red sunflower, thimbleweed, and Rudbeckia. It is native to much of the United States, with locations varying by species, and is usually found in open meadows or damp locations such as woods, swamps, ditches, river banks, and low-lying thickets. It has a thick, black, pungent root, narrow leaves, and a stem growing to a height of three feet.[2] The flowering head is orange and cone-shaped, bearing purple, rose, or white petals from June to September.[3]

Active constituents vary slightly according to species and include caffeic acid derivatives (primarily echinocoside), flavonoids, essential oils, polyacetylenes, alkylamides, and polysaccharides. No single constituent has been found to be primarily responsible for Echinacea's immune-stimulating effect; rather they appear to all work together to accomplish this. Therefore, extracts standardized to a specific echinocoside concentration may not be the most beneficial, as this standardization may be at the expense of the other active constituents.[2]

Myths About Echinacea

Misinterpretation of the scientific literature regarding Echinacea's effect on the immune system has led to the development of several myths regarding Echinacea's therapeutic use including: (1) Echinacea is only appropriate for short-term use because it is not desirable to stimulate the immune system continuously,[4] and (2) Echinacea is an immune stimulator and as such, its use may be contraindicated in "progressive conditions" such as tuberculosis, leukemia, allergies, collagen disorders, multiple sclerosis, HIV/AIDS, and autoimmune disease.[5] However, the Native Americans' and Eclectics' high-quality, traditional-use data is a result of decades of extensive clinical experience, and does not support the suggested limitations. King[2] and Ellingwood[6] recommended long-term use of Echinacea for a variety of chronic conditions, including tuberculosis and autoimmune-related disorders. Similarly, neither modern research data nor authoritative herbal reference sources support the suggested limitations on Echinacea use. Numerous clinical studies of Echinacea have been conducted over the last 20-30 years that overwhelmingly demonstrate its therapeutic benefit and safety, even in patients with autoimmune disorders.[7,8] *The British Herbal Pharmacopoeia*,[9] *The British Herbal Compendium*,[10] and *The Encyclopedia of Common Natural Ingredients Used in Food, Drugs, and Cosmetics*[11] list no contraindications for Echinacea. Weiss also suggests Echinacea has an excellent safety profile and no side effects.[12]

Echinacea and Immune Stimulation

Echinacea's immune-stimulating properties are quite complex and are attributed to the combined effect of several of its constituents.[13] The Eclectic physicians discovered alcohol extracts of Echinacea directly stimulated white blood cell production and phagocytic activity.[6] Modern clinical and *in vitro* research has confirmed the Eclectics' observations regarding increased phagocytosis,[14] NK cell activity, and increased antibody-dependent cellular cytotoxicity, mediated by tumor necrosis factor-alpha (TNF-α). The latter study was conducted using peripheral blood mononuclear cells from normal individuals and patients with either chronic fatigue syndrome or AIDS.[15] Due to its potential to stimulate TNF-α and interleukins 1 and 6, it has been suggested that Echinacea should not be used by AIDS patients as it may speed the course of the disease, although is not a universally held theory.[3,4]

Echinacea angustifolia also appears to have a mild antibiotic effect, probably attributable to its caffeic acid constituent, which is capable of directly inhibiting *Staphylococcus aureus*. In addition, certain polyacetylene constituents of Echinacea have been found to be bacteriostatic against *E.coli* and *Pseudomonas aeruginosa*.[13] *E. angustifolia* was also used by the Eclectics to treat fungal and protozoan infections, most notably malaria and *Trichomonas vaginalis*,[13] although current research in this area is lacking.

Echinacea research during the past few years has primarily focused on its therapeutic benefit in treating symptoms of the common cold. A review of several clinical studies, comprised of over 3900 patients, demonstrates that Echinacea extracts decrease the frequency, symptoms, and severity of the common cold.[16-19] However, other similar studies (although fewer in number) have demonstrated Echinacea use to be of no significant benefit in lessening cold and flu symptoms.[20,21]

Echinacea and Inflammation

Native American and Eclectic uses of Echinacea as an anti-inflammatory agent were centered around poisonous snake bites and insect stings. Caffeic acid derivatives, high molecular weight polysaccharides, flavonoids, and essential oils found in Echinacea all possess anti-inflammatory properties.[13] Although current research on Echinacea's anti-inflammatory effect is minimal, animal studies using *E.*

angustifolia have indicated the polysaccharide constituents of the extracts possess significant anti-inflammatory activity in attenuating paw and ear edema when applied topically to the skin of mice and rats.[22-24]

Echinacea and Cancer

Research on Echinacea's benefit in cancer therapy is minimal and inconclusive, but because of its immune-stimulating properties, it may prove to be a useful adjunct to conventional cancer therapies. An animal study demonstrated Echinacea's ability to enhance cellular immunity in leukemic mice, resulting in a suppressive effect on leukemia, via increased production of endogenous interferon-gamma.[25] In another animal study, peritoneal macrophages from immunosuppressed mice incubated with Echinacea polysaccharides showed increased production of TNF-α and enhanced macrophage activation. The mice in this study also exhibited restored resistance to *Listeria monocytogenes* and *Candida albicans*, lethal infections associated with their immunosuppressed state.[26]

Side Effects, Contraindications, and Herb/Drug Interactions

Historical use, modern research, and herbal reference publications show Echinacea to have an excellent safety profile. However, because it is an immune stimulant, caution should be used in combining it with immunosuppressive drugs such as corticosteroids, cyclosporine, amiodarone, methotrexate, and ketoconazole.[27] Echinacea use has been reported to occasionally cause reversible skin reactions, and for this reason, it should be used with caution in atopic individuals.[28]

Dosage

Echinacea is available in several forms, and dosages vary accordingly. Typical dosages for the various forms are:[29]

Dried root = 0.5 to 1.0 grams three times daily
Tincture (1:5) = 1/2 to 1 teaspoon three times daily
Dry, powdered extract (standardized to 3.5% echinacoside) = 300 mg three times daily
Liquid Extract (1:1) = 1/4 to 1/2 teaspoon three times daily
Freeze Dried = 1 to 2 capsules or tablets three times daily

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