Taraxacum officinale (Dandelion)

Taraxacum officinale

Description

Taraxacum officinale (dandelion), a member of the Asteraceae family, grows to a height of about 12 inches, producing spatula-like leaves and yellow flowers that bloom year-round.[1] Upon maturation, the flower turns into the characteristic seed-containing puffball. Dandelion is grown commercially in the United States and Europe, and the leaves and root are used in herbal medicine. Commercial grade dandelion is typically harvested during the autumn when the inulin content is highest.

Dandelion is commonly used as a food. The leaves are used in salads and teas, while the roots are sometimes used as a coffee substitute. Dandelion leaves and roots have been used for hundreds of years to treat liver, gallbladder, kidney, and joint problems. Dandelion is traditionally considered an alterative and is used for conditions as varied as eczema and cancer.[2] In North America, the Iroquois people prepared infusions and decoctions of the root and whole herb to treat kidney disease, dropsy, and dermatological conditions. As is the case today, dandelion leaves have also been used historically as a diuretic.

Active Constituents

Dandelion root contains an abundance of sesquiterpene lactones, also known as bitter elements (principally taraxacin and taraxacerin).[3] Other related compounds include beta-amyrin, taraxasterol, and taraxerol, as well as free sterols (sitosterin, stigmasterin, and phytosterin). Other constituents include polysaccharides (primarily fructosans and inulin), smaller amounts of pectin, resin, and mucilage, and various flavonoids. Three flavonoid glycosides – luteolin 7-glucoside and two luteolin 7-diglucosides – have been isolated from the flowers and leaves. Hydroxycinnamic acids, chicoric acid, monocaffeyltartaric acid, and chlorogenic acid are found throughout the plant, and the coumarins, cichoriin, and aesculin have been identified in the leaf extracts.[4] Dandelion leaves are a rich source of a variety of vitamins and minerals, including beta carotene, non-provitamin A carotenoids, xanthophylls, chlorophyll, vitamins C and D, many of the B-complex vitamins, choline, iron, silicon, magnesium, sodium, potassium, zinc, manganese, copper, and phosphorous.

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Mechanisms of Action

Digestive Effects

Bitter herbs such as dandelion have been used traditionally to stimulate digestion;[5] however, no pharmacological or clinical studies have been performed to date on this action.

Hepatobiliary Effects

Oral administration of dandelion root extracts has been shown to increase bile release from the gallbladder (cholagogue effect).[6] The bitter principals responsible for this cholagogue effect are also thought to increase bile production in the liver (choleretic effect).[7] A recent rat study found Taraxacum inhibits activity of hepatic phase I detoxification enzymes CYP1A2 (by 15%) and CYP2E (by 48%). Conversely, Taraxacum increased the activity of the phase II enzyme UDP-glucuronosyl transferase.[8]

Diuretic Activity

In experimental research on mice, high amounts of an aqueous extract of dandelion leaf (2 g per 1 kg body weight) has been shown to have diuretic activity comparable to furosemide.[9] Since dandelion is also a rich source of potassium, some think it is capable of replacing potassium lost through diuresis.

Hypoglycemic Effects

An animal study suggests dandelion might possess hypoglycemic activity.[10] This finding is probably in part a result of the high inulin content of the plant. Dandelion's effects on glucose metabolism have not been studied in humans to date.

Other Actions

Evidence suggests dandelion may influence nitric oxide production.[11] Nitric oxide is important for immune regulation and defense; however, this molecule can be inhibited by cadmium. An aqueous extract of dandelion has been shown to overcome this inhibitory effect of cadmium and work in a dose-dependent manner to restore nitric oxide production by mouse peritoneal macrophages.

Antitumor activity of the aqueous extract of dandelion root in mice has also been reported in the scientific literature.[12]

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Clinical Indications

Classically listed as a cholagogue, dandelion root is approved by the German Commission E for the treatment of disturbances in bile flow, stimulation of diuresis, loss of appetite, and dyspepsia.[13] Although there are no published clinical trials on either dandelion root or leaf alone, it has a long history of use by natural health-care practitioners.

Liver/Gallbladder Stasis

Because of dandelion root's cholagogue[6] and choleretic effects,[7] it has been traditionally recommended for people with sluggish liver function due to alcohol abuse or poor diet. The increase in bile flow may help improve fat (including cholesterol) metabolism in the body; however, there are no clinical studies to support these uses. Patients with increased phase I metabolism coupled with impaired phase II activity may especially benefit from Taraxacum supplementation.[8]

Edema

Dandelion leaf is a diuretic[9] and thus may be considered in cases of edema from such conditions as congestive heart failure or premenstrual syndrome. As a diuretic it may also benefit those with hypertension. Although it is suggested dandelion spares potassium, attention to electrolyte balance may be warranted.

Colitis

A small Bulgarian clinical trial found dandelion root in combination with other herbs might be an effective intervention in chronic colitis.[14] Twenty-four patients with chronic nonspecific colitis were treated with an herbal combination consisting of dandelion root, St. John's wort (*Hypericum perforatum*), lemon balm (*Melissa officinalis*), calendula flower (*Calendula officinalis*), and fennel seed (*Foeniculum vulgare*). Spontaneous and palpable pains along the large intestine disappeared in 96 percent of the patients by the 15th day of treatment.

Botanical-Drug Interactions

In an animal study, administration of a dandelion extract (actually *Taraxacum mongolicum*, a close relative of the more common western dandelion) concomitantly with ciprofloxacin decreased absorption of the drug.[15] This was found to be due to the high mineral content of the dandelion herb. Ciprofloxacin should not be taken within two hours of any dandelion preparation. Due to the potential diuretic effect of the leaves, they should be used with caution by those taking prescription diuretic drugs.

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Side Effects and Toxicity

Because of its choleretic and cholegogue activity, dandelion leaf and root should not be used by people with gallstones or bile duct obstruction unless closely supervised by a health-care practitioner.[13] In cases of gastric ulcer or gastritis, dandelion should be used cautiously, as it may cause over-production of stomach acid. Although Taraxacum is high in potassium, it may not be high enough to offset possible potassium loss by long-term use of the leaves as a diuretic.

Constituents of dandelion may cause allergic reactions. The latex of fresh dandelion stems may cause an allergic rash in some people. Dandelion root contains a high amount of inulin, so persons with sensitivity to inulin should probably avoid dandelion. Although reports in the scientific literature refer only to the pollen as being a potential source of photoallergic contact dermatitis,[16,17] and an allergen capable of cross-reactivity in individuals with pollen allergy to other plants of the Compositae family,[18] a report documenting an anaphylactic reaction in an atopic patient following the oral ingestion of an herbal combination containing dandelion indicates a possible need for caution. In this case, the herbal compound was found to have trace amounts of pollen from dandelion and several other medicinal plants, which resulted in this systemic reaction.[19]

Dosage

As a general liver/gallbladder tonic and to stimulate digestion, 3-5 g of dried root or 5-10 ml of tincture made from the root can be taken three times per day.[11] As a mild diuretic or appetite stimulant, 4-10 g of dried leaves can be added to 1 cup (250 ml) of boiling water and drunk as a decoction. Alternatively, 2-5 ml of tincture made from the leaves can be taken three times per day.

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