

The Longwood Herbal Task Force

(<http://www.mcp.edu/herbal/default.htm>) and

The Center for Holistic Pediatric Education and Research

(<http://www.childrenshospital.org/holistic/>)

Devil's Claw (*Harpagophytum procumbens*)

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Principal Proposed Use: Anti-inflammatory for degenerative or rheumatic joint disease and tendonitis

Other Proposed Uses: Analgesic for other pains (headache, menstrual pain), antipyretic, antidiabetic, appetite stimulant and bitter tonic, liver and gall bladder tonic, vulnerary

Overview

The major clinical uses for Devil's claw are for pain relief in joint diseases, back pain and headache. The evidence from scientific studies in animals and humans has resulted in widespread use of standardized Devil's claw as a mild analgesic for joint pain in Europe. There are no studies evaluating its effectiveness as an appetite stimulant or liver tonic, but it is widely used for these purposes. The major potential risks and side effects include possible allergies and potential inotropic, chronotropic, antiarrhythmic and hypotensive effects; it is traditionally contraindicated for patients with gastric and duodenal ulcers, but side effects are rarely reported and tend to be limited to mild gastrointestinal upset. Commercial products are occasionally contaminated with inactive plants and other bitter African plants such as *Elephantorrhiza* and *Acanthosicyos*. There are no studies evaluating its safety or effectiveness during pregnancy, lactation, or childhood.

Historical and Popular Uses

Devil's claw is a native of Southern Africa. It has long been used as a tea by indigenous peoples to treat gastrointestinal disorders and rheumatic conditions. A German farmer who had settled in the area exported the plant to Europe where it also became popular among British, European and Canadian herbalists for the supportive treatment of degenerative or rheumatic joint disease, tendonitis and other pains (headache, backache, menstrual pain)^{1,2,3,4,5}. It is also used

as an antipyretic, appetite stimulant and bitter tonic, for conditions of the liver, gall bladder and urinary tract, and to treat allergies. An ointment containing Devil's claw root is used as a vulnerary (to treat skin injuries and disorders).

Botany

Medicinal species: *Harpagophytum procumbens* DC and *H. zeheri*⁶

Common names: Devil's claw, grapple plant, wood spider, *Teufelskralle* (German), *Trampelklette* (German), *griffe du diable* (French).

Botanical family: Pedaliaceae

Plant description: The name derives from the fruits of the perennial plant, which appear to be covered with small hooks. The fruits are 7-20 centimeters long and 6 cm in diameter; they contain approximately 50 dark seeds. The flowers are large, pale-pink to red. The part used medicinally is the dried tubular and secondary roots and the macerated thick lateral tubers, which are cut into slices and dried.

Where it's grown: Devil's claw is native to the red sand areas in the Transvaal of South Africa and Namibia. It has spread throughout the Kalahari and Savannah desert regions. American products are imported from Africa.

Biochemistry

Devils Claw: Potentially Active Chemical Constituents

- Iridoid glycosides (2.2% total weight)⁷:
 - Harpagosides (very bitter flavor): 0.5 –1.6% (minimum of 1.2% in European standardized products)⁸
 - 8-p-coumaroyl harpagide⁹
 - Procumbide and procumboside
- Phenols: acetoside (verbascoside), isoacetoside¹⁰
- Other: harpagoquinones, amino acids, flavonoids, phytosterols, carbohydrates¹¹

Harpagoside has a very bitter flavor which may make some products unpalatable. The iridoid glycosides have dose-dependent anti-inflammatory and analgesic effects equivalent to

phenylbutazone; they are apparently inactivated by gastric acids¹². Harpagoside is most effective when given parenterally, and loses potency markedly when given by mouth; enteric coated preparations might maintain efficacy despite exposure to gastric acids¹³. Harpagoside inhibits arachidonic acid metabolism through both cyclo-oxygenase and lipoxygenase pathways. The harpagoside content varies within the plant, and is highest in the secondary tubers, with lower levels in the primary roots. The flowers, stems and leaves appear to be devoid of active compounds.

Experimental Studies

Devil's Claw: Potential Clinical Benefits

1. Cardiovascular: Antiarrhythmic
2. Pulmonary: none
3. Renal and electrolyte balance: none
4. Gastrointestinal/hepatic: Appetite stimulant, digestive tonic, liver and gall bladder tonic
5. Neuro-psychiatric: Analgesic: see Immune modulation
6. Endocrine: Antidiabetic
7. Hematologic: none
8. Rheumatologic: Degenerative joint disease: see Immune modulation
9. Reproductive: none
10. Immune modulation: Anti-inflammatory
11. Antimicrobial: none
12. Antineoplastic: none
13. Antioxidant: none
14. Skin and mucus membranes: Vulnerary (wound healing)
15. Other/miscellaneous: none

1. **Cardiovascular: Antiarrhythmic:** This is not a traditional use of Devil's claw.
 - i. *In vitro data:* In isolated rat hearts, Devil's claw extracts had a dose-dependent protective effect against arrhythmias induced by reperfusion¹⁴; similar protective effects were found in isolated rabbit hearts subjected to arrhythmogenic chemicals^{14,15}.

- ii. *Animal data:* In low doses, Devil's claw extracts had mildly negative chronotropic effects and positive inotropic effects^{16,17}; high doses caused a marked negative inotropic effect and reduced coronary blood flow¹⁴. In normotensive rats, intraperitoneal injections of Devil's claw had mild hypotensive effects as well as antiarrhythmic effects¹⁵.
 - iii. *Human data:* none
2. **Pulmonary:** none
 3. **Renal and electrolyte balance:** none
 4. **Gastrointestinal/hepatic:** Appetite stimulant, digestive tonic, liver and gall bladder tonic
 - a. Appetite stimulant: No randomized trials have evaluated this use.
 - b. Digestive tonic
 - i. *In vitro data:* In isolated guinea pig jejunum, Devil's claw extracts decreased the contractile response of smooth muscle to acetylcholine¹⁶; in guinea pig ileum, harpagoside nonselectively inhibited contractions induced by various chemical agonists¹⁸.
 - ii. *Animal data:* none
 - iii. *Human data:* In an adult case series, oral administration of Devil's claw (1 tsp in 2 cups of water) resulted in improvements in constipation, diarrhea, appetite and flatulence¹⁹.
 - c. Liver and gall bladder tonic: No randomized trials have evaluated this use.
 5. **Neuro-psychiatric:** Analgesic: See Immune modulation
 6. **Endocrine:** Antidiabetic: Traditional use; no data.
 7. **Hematologic:** none
 8. **Rheumatologic:** Degenerative joint disease²⁰: See Immune modulation
 9. **Reproductive:** none
 10. **Immune modulation:** Anti-inflammatory
 - i. *In vitro data:* Devil's claw (100 mg/ ml) had no significant impact on prostaglandin synthesis²¹.
 - ii. *Animal data:* In several studies in rats, mice and guinea pigs, harpagoside reduced experimentally-induced inflammation^{22,23,24,25,26}. In one study, the effects of 20 mg/kg/day of Devil's claw were comparable to 40 mg/kg/day of phenylbutazone²⁵.

However, Devil's claw extracts were not as effective as indomethacin, nor were they as effective when given by mouth as when given by injection, apparently due to inactivation by gastric acids^{12,21,27,28,29}.

- iii. *Human data:* In normal volunteers, three weeks of daily treatment with 2 grams of standardized Devil's claw extract had no impact on levels of prostaglandin E2, thromboxane B2, leukotriene B4, or 6-ketoprostaglandin F³⁰. In 13 arthritic patients treated for 13 weeks with Devil's claw tablets (410 mg TID) there were no significant improvements²⁸. In an open trial in 630 adults with joint pain, six months of treatment with Devil's claw extract in daily dosages of 1 – 3 gms TID resulted in pain relief in 42% - 85% (depending on site of pain); the only adverse effect was mild stomach upset even with the highest doses³.

In a double blind study of adults with joint pain, treatment with 770 mg TID of a standardized Devil's Claw extract resulted in significant improvement in pain and flexibility over two months; no side effects were reported^{4,31}. In two separate randomized, double blind, placebo controlled trials of adults suffering from chronic low back pain, Devil's claw treatment provided significant improvement in pain scores within four weeks^{32,33}.

11. **Antimicrobial:** none

12. **Antineoplastic:** none

13. **Antioxidant:** none

14. **Skin and mucus membranes:** Vulnerary (wound healing): Traditional use; no data.

15. **Other/miscellaneous:** none

Toxicity and Contraindications

All herbal products carry the potential for contamination with other herbal products, pesticides, herbicides, heavy metals, and pharmaceuticals.

This is particularly concerning with imports from developing countries.

Allergic reactions can occur to any natural product in sensitive persons.

Allergic reactions have not been reported.

Potentially toxic compounds in Devil's claw: Unknown. Devil's claw is occasionally adulterated with harpagoside-poor primary roots or with other bitter African plants such as *Elephantorrhiza* and *Acanthosicyos*.

Acute toxicity: In a trial of Devil's claw as a treatment for arthritis, one patient withdrew after four days of therapy due to early morning headache, tinnitus, anorexia and loss of taste²⁸. Mild gastrointestinal upset has been reported in sensitive individuals, especially at higher dosages. The LD 50 in mice is greater than 13.5 grams per kg of body weight^{21,23,34}. Because of the lack of effect on the biosynthesis of prostanoids, the adverse effects usually expected with non-steroidal anti-inflammatories and glucocorticoid medications are not expected with Devil's claw^{30,35}.

Chronic toxicity: None in rat studies

Limitations during other illnesses or in patients with specific organ dysfunction: Devil's claw is traditionally contraindicated in patients with gastric or duodenal ulcers due to presumed stimulation of gastric acid secretion; no studies have evaluated this possibility. Because of its stimulant effects on the gall bladder, herbalists recommend that patients with gallstones use Devil's claw only in consultation with a physician. Traditionally, Devil's claw is contraindicated in diabetes, but no data support this assertion. In light of its potential antiarrhythmic effects, potential interactions with antiarrhythmic drugs cannot be excluded.

Interactions with other herbs or pharmaceuticals: None reported

Safety during pregnancy, lactation and/or childhood: Devil's claw is thought to be oxytocic and therefore to be avoided in pregnancy²⁵; however, there are no data to support this recommendation, and no data on Devil's claw's safety or efficacy during pregnancy, lactation, or childhood.

Typical Dosages

Provision of dosage information does NOT constitute a recommendation or endorsement, but rather indicates the range of doses commonly used in herbal practice.

Doses are given for single herb use and must be adjusted when using herbs in combinations. Doses may also vary according to the type and severity of the condition treated and individual patient conditions.

*Adult doses*³⁶:

Dried root:

For pain relief: 3.0 - 4.5 grams of dried root mixed in boiling water, steeped eight hours and taken po TID

For appetite loss: 0.5 - 1.5 grams of dried root, mixed in boiling water, steeped eight hours and taken po TID

*Tincture: (1:5 in 25% alcohol): 0.5 – 1.0 ml TID*²⁵

*(1:10 in 25% alcohol): 3 ml TID*³⁷

*Liquid extract: (1:1 in 25% alcohol): 0.1 – 0.25 ml TID*²⁵

Pediatric dosages: Unknown

Availability of standardized preparations: A German analysis of several commercial products showed variation of harpagoside content from 0.5 to 9.3 mg per tablet, resulting in daily doses of 1.5 to 50 mg^{38,39}. Standardized extracts are available; these should be used whenever possible to ensure adequate dosing.

Dosages used in herbal combinations: Variable

Proprietary names: Algophytum, Arthrosetten H, Arthrotabsm, Artigel, Defencid, Devil's Claw Secondary Root, Doloteffin, Fitokey Harpagophytum, Harpadol, Hariosen, Jucurba N, Rheuma-Sern, Rheuma-Tee, HarpagoMega, Salus

Multi-ingredient preparations containing Devil's claw root: Arktophytum, Arthritic Pain Herbal Formula, Devil's Claw Plus, Lifesystem Herbal Formula 1 Arthritic Aid, Lifesystem Herbal Formula 12 Willowbark, Prost-1, Green Lipped Mussel (FM), Harpagophytum Formula.

See Also:

Devil's Claw Clinician Information Summary:

<http://www.mcp.edu/herbal/devilsclaw/devilsclaw.cis.pdf>

Devil's Claw Patient Fact Sheet:

<http://www.mcp.edu/herbal/devilsclaw/devilsclaw.ph.pdf>

REFERENCES

1. Barnes J, Ernst E. Traditional herbalists' prescriptions for common clinical conditions: A survey of members of the UK National Institute for Medical Herbalists. *Phytotherapy Research* 1998; 12:369-71.
2. Caprasse M. Description, identification and therapeutical uses of the "devil's claw": *Harpagophytum procumbens* DC. *Journal de Pharmacie de Belgique* 1980; 35:143-9.
3. Belaiche P. Etude clinique de 630 cas d'arthrose traites par le nebulisat aqueux d'*Harpagophytum procumbens* (Radix). *Phytotherapy* 1982; 1:22-28.
4. Lecomte A, Costa J. *Harpagophytum* dans l'arthrose: Etude en double insu contre placebo. *37 2 Le Magazine* 1992; 15:27-30.
5. Chrubasik S, Wink M. Traditional herbal therapy for the treatment of rheumatic pain: Preparations from devil's claw and stinging nettle. *Pain Digest* 1998; 8:94-101.
6. Baghdikian B, Lanhers MC, Fleurentin J, et al. An analytical study, anti-inflammatory and analgesic effects of *Harpagophytum procumbens* and *Harpagophytum zeyheri*. *Planta Medica* 1997; 63:171-6.
7. Kikuchi T. New iridoid glucosides from *Harpagophytum procumbens*. *Chem Pharm Bull* 1983; 31:2296-2301.
8. Haag-Berrurier M, Kuballa B, Anton R. Dosage des glucoiridoïdes totaux dans la racine d'*Harpagophytum procumbens* DC und *Harpagophytum zeyheri* DECNE. *Plant Medica* 1978; 12:197-206.
9. Czygan FC, Kruger A, Schier W, Volk O. Pharmaceutical-biological analysis of the family *Harpagophytum* (Bruch.) DC ex Meissn. Part 1. *Deutsche APtheker Zeitung* 1977; 117:1431-34.
10. Burger J. Iridoid and phenolic glycosides from *Harpagophytum procumbens*. *Phytochemistry* 1987; 26:1453-7.
11. Ziller K, Franz G. Analysis of the water-soluble fraction from the roots of *Harpagophytum procumbens*. *Planta Med* 1979; 37:340-8.
12. Soulimani R, Younos C, Mortier F, Derrieu C. The role of stomachal digestion on the pharmacological activity of plant extracts, using as an example extracts of *Harpagophytum procumbens*. *Canadian Journal of Physiology & Pharmacology* 1994; 72:1532-6.
13. Duke JA. *Green Pharmacy*. Emmaus, PA: Rodale Press, 1997:507.
14. Costa De Pasquale R, Busa G, Circosta C, et al. A drug used in traditional medicine: *Harpagophytum procumbens* DC. III. Effects on hyperkinetic ventricular arrhythmias by reperfusion. *Journal of Ethnopharmacology* 1985; 13:193-9.
15. Circosta C, Occhiuto F, Ragusa S, et al. A drug used in traditional medicine: *Harpagophytum procumbens* DC. II. Cardiovascular activity. *Journal of Ethnopharmacology* 1984; 11:259-74.
16. Occhiuto F, Circosta C, Ragusa S, Ficarra P, Costa De Pasquale R. A drug used in traditional medicine: *Harpagophytum procumbens* DC. IV. Effects on some isolated muscle preparations. *Journal of Ethnopharmacology* 1985; 13:201-8.

17. Occhiuto F, De Pasquale A. Electrophysiological and haemodynamic effects of some active principles of *Harpagophytum procumbens* DC. in the dog. *Pharmacological Research* 1990; 22:72-3.
18. Fontaine J, Elchami AA, Vanhaelen M, Vanhaelen-Fastre R. Biological analysis of *Harpagophytum procumbens* D.C. II. Pharmacological analysis of the effects of harpagoside, harpagide and harpagogenine on the isolated guinea-pig ileum. *Journal de Pharmacie de Belgique* 1981; 36:321-4.
19. Zimmerman W. Pflanzliche Bitterstoffe in der Gastroenterologie. *Z. Allgemeinmed* 1976; 54:1178-84.
20. Wenzel P, Wegener T. *Harpagophytum procumbens* -- A plant antirheumatic agent. *Deutsche Apotheker Zeitung* 1995; 135:15-28.
21. Whitehouse LW, Znamirowska M, Paul CJ. Devil's Claw (*Harpagophytum procumbens*): no evidence for anti-inflammatory activity in the treatment of arthritic disease. *Canadian Medical Association Journal* 1983; 129:249-51.
22. Eichler O, Koch C. Antiphlogistic, analgesic and spasmolytic effect of harpagoside, a glycoside from the root of *Harpagophytum procumbens* DC. *Arzneimittel-Forschung* 1970; 20:107-9.
23. Erdos A, Fontaine R, Friehe H, Durand R, Poppinghaus T. Contribution to the pharmacology and toxicology of different extracts as well as the harpagosid from *Harpagophytum procumbens* DC. *Planta Medica* 1978; 34:97-108.
24. Lanhers MC, Fleurentin J, Mortier F, Vinche A, Younos C. Anti-inflammatory and analgesic effects of an aqueous extract of *Harpagophytum procumbens*. *Planta Medica* 1992; 58:117-23.
25. Newall CA, Anderson LA, Phillipson JD. *Herbal Medicines: A guide for Health-care Professionals*. London: The Pharmaceutical Press, 1996:296.
26. Jadot G, Lecomte A. Activite anti-inflammatoire d'*Harpagophytum procumbens* DC. Lyon. *Mediterranee Medical Medecine du Sud-Est* 1992; 28:833-5.
27. McLeod DW, Revell P, Robinson BV. Investigations of *Harpagophytum procumbens* (Devil's Claw) in the treatment of experimental inflammation and arthritis in the rat [proceedings]. *British Journal of Pharmacology* 1979; 66:140P-141P.
28. Grahame R, Robinson BV. Devil's claw (*Harpagophytum procumbens*): pharmacological and clinical studies [letter]. *Annals of the Rheumatic Diseases* 1981; 40:632.
29. Recio M, Giner R, Manez S, Rios J. Structural considerations on the iridoids as anti-inflammatory agents. *Planta Medica* 1994; 60:232-4.
30. Moussard C, Alber D, Toubin MM, Thevenon N, Henry JC. A drug used in traditional medicine, *harpagophytum procumbens*: no evidence for NSAID-like effect on whole blood eicosanoid production in human. *Prostaglandins Leukotrienes & Essential Fatty Acids* 1992; 46:283-6.
31. Schulz V, Hansel R, Tyler VE. *Rational Phytotherapy: A Physicians' Guide to Herbal Medicine*. Berlin: Springer, 1997:306.
32. Chrubasik S, Zimpfer C, Schutt U, Ziegler R. Effectiveness of *Harpagophytum procumbens* in treatment of acute low back pain. *Phytomedicine* 1996; 3:1-10.

33. Chrubasik S, Schmidt A, Junck H, Pfisterer M. Wirksamkeit und Wirtschaftlichkeit von Teufelskrallenwurzelextract bei Ruckenschmerzen: erste Ergebnisse einer Anwendungsbeobachtung. *Forsch Komplementarmed* 1997; 4.
34. Vanhaelen M, Vanhaelen R, Samaey-Fontaine J, Elchamid A, Niebes P, Matagne D. Aspects botaniques, constitution chimique et activite pharacologique d'*Harpagophytum procumbens* DC. *Phytotherapy* 1983; 5:7-13.
35. Lowe D. *Harpagophytum procumbens* DC. Eine Übersicht zur Pharmakologie und Wirksamkeit. *Erfahrungsheilkunde* 1995; 2:74-9.
36. Abramaowitz M. *Med Letter* 1979; 21:30-?
37. Anonymous. *Harpagophyti radix*. ESCOP Monographs. Elburg, 1996.
38. Eich J, Schmidt M, Betti G. HPLC analysis of iridoid compounds of *Harpagophytum* taxa: Quality control of pharmaceutical drug material. *Pharmaceutical and Pharmacological Letters* 1998; 8:75-78.
39. Mestdagh O, Torck M. Quality evaluation of *Harpagophyton* capsules. *Annales Pharmaceutiques Francaises* 1995; 53:135-7.