

Leonurus cardiaca

Motherwort

Indications

Cardiac insufficiency, tachycardia or other arrhythmias, hypertension, stress and anxiety, and hyperthyroidism.

Mechanism of Action

Leonurus cardiaca contains monoterpenes, diterpenes, triterpenes, nitrogen-containing compounds, phenylpropanoids, flavonoids and phenolic acids, lectins, and phytosterols as well as volatile oils, sterols, and tannins. Quality *Leonurus* products should contain at least 0.2% flavonoid, often standardized to hyperoside content. In addition to these ubiquitous compounds, *Leonurus* contains iridoid glycosides such as leonuride and the alkaloids leonurine, leonurinine, and stachydrine,^{1,2,3,4,5} all credited with medicinal effects.

Leonurine is a guanidine alkaloid shown to have cardioprotective, hypotensive, uterotonic, and neuroprotective effects.⁶ Leonurine has been reported to be a constituent of *Leonurus cardiaca*; however, some assays could not confirm its presence in *L. cardiaca*.⁶ Related alkaloids, including synthetic versions, may act in similar ways^{7,8,9} Animal investigations suggest that leonurine ameliorates the progression of atherosclerotic lesions and vascular dysfunction via suppression of inflammatory factors and oxidative stress,^{10,11} reducing angiotensin-driven fibrosis of vascular cells by attenuating various reactive oxygen species.¹²

Animal studies have also shown *Leonurus* extracts to reduce left ventricular pressure, increase coronary flow, and prolong the PQ interval,¹³ with some research suggesting some that antiarrhythmic effects may occur via antagonism of calcium channels, thereby reducing the speed of repolarization.^{13,14,15} Isolated lavandulifolioside present in *Leonurus* has been credited with contributing to the negative chronotropism and hypotensive effects of the whole plant extract.¹⁶

Cardiovascular diseases often involve an alteration of cardiac muscle mitochondria, and agents that support mitochondrial function show promise in preserving heart function and protecting against cardiovascular pathology. *Leonurus* constituents chlorogenic acid, orientin, quercetin, hyperoside, and rutin are all credited with antioxidant activity and are shown to attenuate the production of reactive oxygen species in the mitochondria,^{17,18} a proposed mechanism of cardioprotection. Oxidative stress also induces apoptosis of function cardiomyocytes, and motherwort may protect heart muscle mitochondria in a manner that maintains cell viability.^{19,20,21,22,23}

Evidence-Based Research

Leonurus cardiaca has been credited with antioxidant and antiinflammatory activity and an ability to improve heart function and blood circulation,¹⁷ partly via mild negative chronotropic effects and hypotensive activity, as has been demonstrated in clinical trials.²⁴ One human pilot study investigated *Leonurus* dosed at 1200 mg/day in patients with hypertension accompanied by anxiety and sleep disorders. A positive effect on mental emotional status and hypertension was reported after 4 weeks, without significant side effects.²⁵ According to the Clinical Global Impression scale, a significant improvement in anxiety and depression parameters was observed in 32% of patients, a moderate improvement in 48% of patients, and a weak effect in 8% of patients. Twelve percent of patients did not respond to therapy.

Safety in Pregnancy and Breastfeeding

Leonurus has traditional use as an emmenagogue (a botanical known to promote menstrual flow) and should be avoided by pregnant women in the first trimester, especially in those with a history of miscarriage.

One human randomized controlled trial showed an Asian species of motherwort, *Leonurus heterophyllus*, to prevent postpartum hemorrhage after cesarean section when used in a parenteral form.²⁶

General Safety

Leonurus is considered safe and not associated with any known toxicity or side effects.

Dosage

Leonurus capsules will usually contain between 200 and 500 mg of dried herb, and this herb is generally considered safe at high doses up to 2 g/day.

Traditional Uses

Folkloric uses of motherwort, emphasized its use as a calming and relaxing herbal agent with tonic effects on hormonal, nervous, and cardiac systems. It was long been classified as a hypotensive nervine,²⁷ capable of both relaxing the blood vessels and calming nervous tension while restoring energy in those with “nervous exhaustion.” For its ability to correct the action of the heart from varied causes, it is often referred to as a cardiotonic.

Leonurus has been used to treat heart (e.g., palpitations and tachyarrhythmias) and blood pressure problems, especially when secondary to stress and anxiety.^{28,29,30} Chinese species of motherwort are also used for coronary artery disease and cerebral ischaemia.³¹

Leonurus is also a traditional childbirth and postpartum botanical that has been used for centuries as a galactagogue and uterine tonic both before and after childbirth.³² Having emmenagogue actions, presumably because both hormonal and vascular effects, it has been used to treat various gynecologic and obstetrical conditions including amenorrhea, fertility, menstrual discomforts, and thyroid disorders. Motherwort is also investigated for inhibitory effects on breast cancer³³ and uterine fibroids.³⁴

References

- ¹ **Herba Pol.** 1991;37:3–7 (Chem Abst. 116:170207d). *Sterols from Leonurus cardiaca L., growing in different geographical areas.* Senatore F, et al.
- ² **Justus Liebigs Ann. Chem.** 1973;(4):566–72 (Chem Abst. 79:75831m). *Natural products from medicinal plants. XVIII. Isolation and structure elucidation of a new c15-irodoid glucoside from Leonurus cardiaca.* Weinges K, et al.
- ³ **Nauch. Tr. Vissh. Pedagog. Inst., Khim Biol.** 1970;8:129–32 (Chem Abst. 103:200749h). *Structure of alkaloids from Leonurus cardiaca.* Gulubov AZ, et al.
- ⁴ **Arch Intern Pharmacodynam.** 1948;76:132–52. *Pharmacology of Leonurus cardiaca and Leonurus marrubiastrum L.* Erspamer V.
- ⁵ **J Nat Prod.** 1985;48:494–507. *Flavonoid -O-Glycosides form the herbs of Leonurus cardiaca.* Kartnig T, et al.
- ⁶ **Pharmazie.** 2012;67(12):973–9. *Leonurus japonicus, Leonurus cardiaca, Leonotis leonurus: a novel HPLC study on the occurrence and content of the pharmacologically active guanidino derivative leonurine.* Kuchta K, Ortwein J, Rauwald HW.
- ⁷ **Eur J Med Chem.** 2011;46(9):3996–4009. *Leonurine-cysteine analog conjugates as a new class of multifunctional anti-myocardial ischemia agent.* Liu C, Guo W, Shi X, Kaium MA, Gu X, Zhu YZ.
- ⁸ **Bioorg Med Chem Lett.** 2010;20(23):6942–6. *Synthesis and biological evaluation of novel leonurine-SPRC conjugate as cardioprotective agents.* Liu C, Gu X, Zhu YZ.
- ⁹ **J Cardiovasc Pharmacol.** 2009;54(5):437–44. *4-Guanidino-n-butyl syringate (Leonurine, SCM 198) protects H9c2 rat ventricular cells from hypoxia-induced apoptosis.* Liu XH, Chen PF, Pan LL, Silva RD, Zhu YZ.
- ¹⁰ **Atherosclerosis.** 2012;224(1):43–50. *SCM-198 attenuates early atherosclerotic lesions in hypercholesterolemic rabbits via modulation of the inflammatory and oxidative stress pathways.* Zhang Y, Guo W, Wen Y, Xiong Q, Liu H, Wu J, Zou Y, Zhu Y.
- ¹¹ **Eur J Pharmacol.** 2012;680(1–3):108–14. *Leonurine attenuates lipopolysaccharide-induced inflammatory responses in human endothelial cells: involvement of reactive oxygen species and NF- κ B pathways.* Liu XH, Pan LL, Yang HB, Gong QH, Zhu YZ.
- ¹² **Free Radic Biol Med.** 2013;54:93–104. *Leonurine (SCM-198) attenuates myocardial fibrotic response via inhibition of NADPH oxidase 4.* Liu XH, Pan LL, Deng HY, Xiong QH, Wu D, Huang GY, Gong QH, Zhu YZ.
- ¹³ **Planta Med.** 2010;76(6):572–82. *Cardiac and electrophysiological effects of primary and refined extracts from Leonurus cardiaca L. (Ph.Eur.).* Ritter M, Melichar K, Strahler S, Kuchta K, Schulte J, Sartiani L, Cerbai E, Mugelli A, Mohr FW, Rauwald HW, Dhein S.
- ¹⁴ **Biol Pharm Bull.** 2012;35(8):1249–56. *Effects of Leonurine on L-type calcium channel in rat ventricular myocytes.* Xin H, Gu M, Wang WW, Huang SY, Li FP, Cai H, Zhu YZ, Zhang XM.
- ¹⁵ **Life Sci.** 2001;68(8):953–60. *Endothelium-independent vasorelaxation by leonurine, a plant alkaloid purified from Chinese motherwort.* Chen CX, Kwan CY.
- ¹⁶ **J Ethnopharmacol.** 2002;80(1):85–90. *Pharmacological effects of lavandulifolioside from Leonurus cardiaca.* Miłkowska-Leyck K, Filipek B, Strzelecka H.
- ¹⁷ **Planta Med.** 2014;80(7):525–32. *The effect of Leonurus cardiaca herb extract and some of its flavonoids on mitochondrial oxidative phosphorylation in the heart.* Bernatoniene J, Kopustinskiene DM, Jakstas V, Majiene D, Baniene R, Kuršvietiene L, Masteikova R, Savickas A, Toleikis A, Trumbeckaite S.
- ¹⁸ **Stroke.** 2010;41(11):2661–8. *Leonurine protects middle cerebral artery occluded rats through antioxidant effect and regulation of mitochondrial function.* Loh KP, Qi J, Tan BK, Liu XH, Wei BG, Zhu YZ.

- ¹⁹ **Curr Pharm Biotechnol.** 2010;11(8):895-905. *Antiapoptotic effect of novel compound from Herba leonuri - leonurine (SCM-198): a mechanism through inhibition of mitochondria dysfunction in H9c2 cells.* Liu XH, Pan LL, Gong QH, Zhu YZ.
- ²⁰ **Eur J Pharmacol.** 2010;649(1-3):236-41. *Leonurine (SCM-198) improves cardiac recovery in rat during chronic infarction.* Liu X, Pan L, Gong Q, Zhu Y.
- ²¹ **Phytomedicine.** 2010;17(10):753-9. *Leonurine improves ischemia-induced myocardial injury through antioxidative activity.* Liu XH, Pan LL, Chen PF, Zhu YZ.
- ²² **Clin Exp Pharmacol Physiol.** 2009;36(7):696-703. *Protective effects of leonurine in neonatal rat hypoxic cardiomyocytes and rat infarcted heart.* Liu XH, Xin H, Hou AJ, Zhu YZ.
- ²³ **Eur J Pharmacol.** 2009;612(1-3):75-9. *Herba leonurine attenuates doxorubicin-induced apoptosis in H9c2 cardiac muscle cells.* Xin H, Liu XH, Zhu YZ.
- ²⁴ **Phytother Res.** 2013;27:1115-20. *Leonurus cardiaca L. (motherwort): a review of its phytochemistry and pharmacology.* Wojtyniak K, Szymański M, Matławska I.
- ²⁵ **Phytother Res.** 2011;25(4):540-3. *Effect of Leonurus cardiaca oil extract in patients with arterial hypertension accompanied by anxiety and sleep disorders.* Shikov AN, Pozharitskaya ON, Makarov VG, Demchenko DV, Shikh EV.
- ²⁶ **Zhonghua Fu Chan Ke Za Zhi.** 2009;44(3):175-8. *Multi-center study of motherwort injection to prevent postpartum hemorrhage after caesarian section.* Lin JH, Lin QD, Liu XH, Yan JY, He J, Li L, Gu H, Sun LZ, Zhang JP, Yu S, Ma YY, Niu JM, Xia Y, Zhao SC, Li W, Wang HL, Wang BS.
- ²⁷ **Nauchni Tr Visshiya Med Inst Sofiya** 1960;37(5):145-52. *Obtaining Galenic and neogalenic preparations and experiments on the isolation of active substances from Leonurus cardiaca.* Isaev L, Bojadzieva M.
- ²⁸ Weiss, R. *Weiss's Herbal Medicine.* Thieme; 1st edition, 2001, pg. 169.
- ²⁹ Mitchell, W. *Plant Medicine in Practice.* Churchill Livingstone, 2003, pg.78
- ³⁰ Felter, H.W. *The Eclectic Materia Medica, Pharmacology and Therapeutics.* Eclectic Medical Publications, 1983.
- ³¹ **Clin Exp Pharmacol Physiol.** 2012;39(3):274-82. *Active chemical compounds of traditional Chinese medicine Herba Leonuri: implications for cardiovascular diseases.* Liu XH, Pan LL, Zhu YZ.
- ³² **American Materia Medica, Therapeutics, and Pharmacognosy,** 11th ed, 1919. Ellingwood F.
- ³³ **Anticancer Res** 1990;10(4):1019-23. *Effects of motherwort (Leonurus sibiricus L) on preneoplastic and neoplastic mammary gland growth in multiparous GR/A mice.* Nagasawa H, Onoyama T, Suzuki M, Hibino A, Segawa T, Inatomi H.
- ³⁴ **Anticancer Res** 1992;12(1):141-3. *Further study on the effects of motherwort (Leonurus sibiricus L) on preneoplastic and neoplastic mammary gland growth in multiparous GR/A mice.* Nagasawa H, Inatomi H, Suzuki M, Mori T.

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