

## ***Andrographis paniculata*, the Key Facts for Therapeutic Use**

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### Introduction: What is *andrographis paniculata*?

*Andrographis paniculata* Nees is a slender upright annual varying in height from 30 to 100 cm (1 to 3 feet), with a square stem and « lanceolate leaves » (i.e., shaped like a lance, sharp at the ends and curved in the middle).

*Andrographis* is indigenous to the plains of India where it is called Kalmegh (in the Bengali language) or Kiryat (in the Hindi language). It is cultivated throughout Southeast Asia and in China where it is called Chuan Xin Lian, and has also been introduced to the West Indies.

*Andrographis* does not contain and has nothing to do with « androgens » (testosterone) or any steroids. The active components of *andrographis* are « andrographolides », very bitter compounds known as diterpene lactones found in the aerial parts of the plant (leaves and stems). The andrographolide content of the leaves varies considerably from season to season, such that standardized extracts are much more reliable as means of supplementation than the leaves or the whole plant.

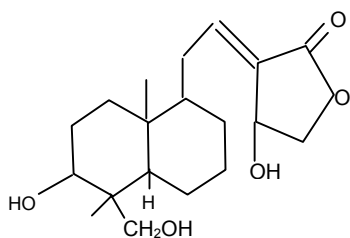


Fig. 1: Structure of andrographolide

### Traditional uses of *andrographis*.

The geographical distribution of the plant has led to its traditional use in Ayurvedic (Indian), Thai and Chinese medicine. According to these traditions, *andrographis* dispels heat (i.e., is antipyretic) and removes toxins, which makes it a good treatment for infectious fever-causing diseases. It has been used in bacterial dysentery, arresting diarrhea and in upper respiratory

infections, tonsillitis, pharyngitis, laryngitis, pneumonia, tuberculosis, and pyelonephritis. It has also been used in herpes and skin infections, and in helminthic (parasitic) infections. Finally, it has been used in conditions as diverse and unrelated as snakebite, to terminate pregnancies and diabetes. These conditions are so varied and seemingly unconnected that more recent research has sought to corroborate some of these applications.

### **Recent research on *Andrographis* : recommended uses**

Studies performed in the last 15 years in several locations and published in Western Journals have confirmed and adapted many of the traditional uses of *andrographis* for ailments of our own. The use of *andrographis* in reducing the incidence or severity of upper respiratory tract infections, including colds and other manifestations such as tonsillitis and laryngitis has been popular in Scandinavia over the last decade, and is beginning to gain acceptance in North America. A good review has been published in "The Natural Pharmacist" ([www. TNP.com](http://www.TNP.com)).

Publications resulting from several clinical studies by researchers in Chile and Sweden provide a credible body of literature. *Andrographis paniculata* reduces the incidence and severity of the common cold. In a randomized placebo-controlled double blind study to assess the possible preventive effect of *Andrographis paniculata* against the common cold, 107 students were randomized to the *Andrographis* group (n=54, 200 mg *Andrographis* supplying a minimum of 11 mg of andrographolides, a very low dose) or to the control group (n=53, placebo). The study was carried out for 3 months during the winter. The incidence of colds in the *Andrographis*-treated subjects was 30%, as compared to 62% in the control group (association between *Andrographis* and absence of colds significant,  $p < 0.01$ ) (Caceres et al 1997).

In the first of several controlled studies aimed at assessing the effect of *Andrographis* on symptoms of the common cold, 33 patients received 1200 mg of *Andrographis paniculata* containing a minimum of 48 mg of andrographolides, while the 28 control patients received a placebo (Hancke et al 1995). After 4 days, *Andrographis* was found to have a significant

beneficial effect on tiredness, shivering, sore throat, muscular aches, rhinitis, sinus pains, and overall disease, but not on lymphatic swelling. Similar results have been obtained in 3 additional studies using the same or similar doses (Melchior et al 1996; Caceres et al 1999; Melchior et al 2000). Altogether, controlled studies involving over 500 subjects indicate that *Andrographis paniculata* is effective at reducing the prevalence and intensity of colds and sinusitis, and shortening the duration of the symptoms.

What is the mechanism of this effect? One possibility is that *Andrographis* is an immune booster, a possibility supported by the fact that it stimulates several immune parameters in mice. The results suggest that extracts are more potent than purified andrographolides (Puri et al 1993). In addition, research suggests that andrographolides have a direct antiviral effect (Chang et al 1991) and a direct antiparasitic effect (Raj 1975), but not a direct antibacterial effect (Leelarasamee et al 1990). Although the present results are insufficient for a general recommendation for use in viral or parasitic conditions, they open the door for potential future applications.

### **Other uses of *Andrographis*: coronary artery disease and liver protection**

In addition to its usefulness in colds, preliminary research in animals has indicated that *Andrographis* may be useful in preventing coronary heart disease (CHD), and especially in preventing a condition associated with the treatment of CHD that has been very difficult to control: restenosis.

Restenosis is defined as the rapid return of atherosclerotic blockage following coronary angioplasty, a technique widely used by cardiologists to open up blocked coronary arteries. It is well accepted that fish oil has beneficial effects in the prevention and management of cardiovascular disease (Simopoulos 1997). However, even though it may help, fish oil has not conclusively been shown to reduce restenosis following angioplasty. In an animal model, *andrographis* was shown to be twice as effective as fish oil in preventing the incidence and severity of restenosis following angioplasty (Wang and Zhao 1993). The mechanism may be the antithrombotic effect of *andrographis*,

which may occur as a result of decreases in thromboxane and platelet aggregation (Zhao and Fang 1991).

*Andrographis paniculata* has also been shown to be a liver-protecting substance. *Andrographis* is hepatoprotective in mice treated with carbon tetrachloride or tert-butylhydroperoxide, both highly toxic compounds (Kapil et al 1993). Using this model, the results indicate that andrographolides compare well with the known hepatoprotective agent silymarin. *Andrographis* was also found to be superior to silymarin in protecting the liver against paracetamol toxicity (Visen et al 1993) and against paracetamol and galactosamine (Handa and Sharma 1990).

### **Pharmacokinetics and safety of andrographolides**

According to recent research, andrographolides are highly bioavailable in humans. Following oral administration, doses of 20 mg of andrographolides are readily absorbed, reach a peak plasma value in 1.5-2 hours and have a mean plasma residence time of 10 hours (Panossian et al 2000). Labeled andrographolide is readily distributed throughout the body, including brain and spinal cord. After 72 hours, nearly 90% of andrographolides are excreted, mostly by urinary excretion, although there is still some discussion about this (Wuxi Medicine Institute 1979).

Possibly the best indication of the safety of *Andrographis paniculata* has been its use for many years as a traditional remedy in Southeast Asia, in China and extensive use in Europe for the prevention and treatment of colds. For all of these uses, there have been no reports of concerns or safety warnings associated with *Andrographis*. In addition, there have been reports in the Chinese medical literature of administration of high doses of *Andrographis paniculata* in animals and humans, as reported by Sandberg (1994).

In animals, there was no acute or short term toxicity of very high doses (1-10 g / kg body weight) in three species, and no effect of these levels on any of the major organs. No effect levels (NOEL) in animals are probably greater than 100 mg / kg body weight and may even approach the gram level.

Although no systematic long term studies have been done in humans, subjects given *Andrographis* at recommended doses had no changes in hepatic or renal function, blood cell counts or blood chemistries (Hancke et al 1995). According to Barilla (1999), humans have also been treated with high levels, including a study in which levels of 50-80 mg/kg were administered intravenously to subjects for periods of 2 months, with no observed toxicity.

It should be made clear to all potential users of *Andrographis* that it has clear antifertility effects in experimental animals, both in males and in females. Male rats become infertile at intakes of 20 mg / day (Akbarsha et al 1990), and female rats become infertile at high doses (Zoha et al 1989) and may abort (Sandberg 1994).

### **Summary and Conclusion: *Andrographis paniculata***

*Andrographis paniculata*, a plant originating in India, is a traditional remedy for fever and various infections. Controlled clinical studies have indicated that *Andrographis paniculata* is effective at reducing the prevalence and intensity of colds and sinusitis, and shortening the duration of the symptoms. Preliminary research has indicated that *Andrographis paniculata* may also be useful in cardiovascular disease and in preventing liver toxicity. Although *Andrographis paniculata* no reported toxicity on any organs, it has been reported to decrease fertility in both male and female animals. Therefore, it should not be used by women seeking to conceive or by their partners, and should not be used by pregnant women.

### **References**

Akbarsha MA, Manivannan B, Shahul HK, et al. Antifertility effect of *Andrographis paniculata* (Nees) in male albino rat. Indian J Exp biol 1990;28:421-426.

Barilla J, *Andrographis paniculata*. Keats Publishing, Los Angeles, CA, USA; 1999.

Caceres DD, Hancke JL, Burgos RA et al. use of visual analogue scale measurements to assess the effectiveness of standardized *Andrographis paniculata* extract in reducing the symptoms of common cold. A randomized double blind placebo study. Phytomedicine 1999;6(4):217-223.

Caceres DD, Hancke JL, Burgos RA, Wikman GK. Prevention of common colds with *Andrographis paniculata* dried extract. Phytomedicine 1997;4(2):101-104.

Chang RS, Ding L, Chen GQ, et al: Dehydroandrographolide succinic acid monoester as an inhibitor against the human immunodeficiency virus. *Proc Soc Exp Biol Med* 1991;197:59-66.

Hancke J, Burgos R, Caceres D, Wilkman G. A Double-blind Study with a New Monodrug Kan Jang: Decrease of Symptoms and Improvement in the Recovery from Common Colds. *Phytother Res* 1995;9:559-562.

Handa SS and Sharma A: Hepatoprotective activity of andrographolide against galactosamine and paracetamol intoxication in rats. *Indian J Med Res* 1990;92:284-292.

Huang KC, *The Pharmacology of Chinese Herbs*. CRC Press, Boca Raton, FL, USA; Year?

Kapil A, Koul IB, Banerjee SK, Gupta BD: Antihepatotoxic effects of major diterpenoid constituents of *Andrographis paniculata*. *Biochem Pharmacol* 1993;46(1):182-185.

Leelarasamee A, Trakulsomboon S, Sittisomwong N: Undetectable anti-bacterial activity of *Andrographis paniculata*. *J Med Assoc Thai* 1990;73:299-304.

Melchior J, Palm S and Wikman G: Controlled clinical study of standardized *Andrographis paniculata* extract in common cold. *Phytomedicine* 1996;3(4):315-318.

Panossian A, Ovhanisyan A, Mamikonyan G, et al: Pharmacokinetic and oral bioavailability of andrographolide from *Andrographis paniculata* fixed combination Kan Jang in rats and human. *Phytomedicine* 2000 Oct;7(5):351-364.

Puri A, Saxena R, Saxena RP, et al: Immunostimulant agents from *Andrographis paniculata*. *J Nat Prod* 1993;56:995-999.

Raj RK: Screening of indigenous plants for anthelmintic action against human *Ascaris lumbricoides*. *Indian J Physiol Pharmacol* 1975;19(1)

Sandberg F: *Andrographidis herba Chuanxinlian, A Review*. American Botanical Council, Austin, Texas, USA; 1994.

Visen PK, Shukla B, Patnaik GK, Dhawan BN: Andrographolide protects rat hepatocytes against paracetamol-induced damage. *J Ethnopharmacol* 1993;40(2):131-136.

Wang DW and Zhao HY. Experimental studies on prevention of atherosclerotic arterial stenosis and restenosis after angioplasty with *Andrographis paniculata* and fish oil. *J Tongji Med Univ* 1993;13(4):193-198.

Wuxi Medicine Institute, Sushow Medical Academy, *Acta Biochemica Biophysica Sinica* 1979;11: no pages listed.

Zhao HY and Fang WY: Antithrombotic effects of *Andrographis paniculata* nees in preventing myocardial infarction. *Chin Med J (Engl)* 1991;104(9):770-775.

Zoha MS, Hussain AHM, Choudhury SAR. Antifertility effect of *Andrographis paniculata* in mice. *Bangladesh Med Res Counc Bull* 1989;15:34-37.

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