

# Ginger



Photo © Steven Foster  
*Zingiber officinale* Roscoe.

Text by Armando Gonzalez Stuart, Ph.D., 2005

**Botanical family:** Zingiberaceae

**Common names in Spanish:** Jengibre, Gengibre, Ancoas.

**Medicinal parts:** The rhizomes (underground stems) (Samuelsson, 2000).

## History

Ginger has been used by traditional Chinese and Indian medicine for over 25 centuries (Castleman, 2001; Bruneton, 1999; Foster and Tyler, 2000). Ginger was brought to Mexico by the Spaniards and later introduced to Jamaica, the latter currently being one of the world's foremost producers of this species (Wichtl, 2004; Guenwald, 2000; Ody, 2000). Ginger is used in Mexican traditional medicine, mainly for gastrointestinal complaints (Adame and Adame, 2000; Martínez, 1989).

In recent times, ginger has been introduced into various tropical countries where diverse chemotypes have been developed (Wichtl, 2004).

## Active Principles

- The content of the active principles is not uniform and can vary significantly between plant varieties and regions in which ginger is grown. (Gruenwald, 2004; Foster and Tyler, 2000; Robbers and Tyler, 2000; Bruneton, 1999). In some instances, certain commercial preparations

made from ginger are devoid of any medicinal activity, as the plant's essential components have been extracted before packaging (Adame and Adame, 2000).

- Volatile oil (zingiberene, zingiberol, D-camphor)
- Shogaols
- Diarylheptanoids (gingerenones, A and B)
- Gingerols

(Skenderi, 2004; Wichtl, 2004).

### **Applications in Herbal Therapy**

- Against nausea and vomiting (antiemetic) during motion sickness and seasickness (Langner et al., 1998; Stewart et al., 1991; Grontved et al., 1988; Grontved and Hentzer, 1986; Mowery and Clayson, 1982). Apparently, this effect is not mediated through the central nervous system (CNS), but rather, ginger's active principles act directly on the gastrointestinal tract (Foster and Tyler 2000; Holtmann et al., 1989).
- Ginger juice produces anti-motion sickness action possibly by central and peripheral anticholinergic and antihistaminic effects (Qian and Liu, 1992). Some researchers hypothesize that ginger ameliorates the nausea associated with motion sickness by preventing the development of gastric dysrhythmias and the elevation of plasma vasopressin (Lien et al., 2003).
- To treat *hyperemesis gravidarum* (serious cases of "morning sickness"), especially during the first trimester of pregnancy (Barrett, 2004; Kraft and Hobbs, 2004; Blumenthal, 2003, 2000, 1998; Fugh-Berman and Kronenburg, 2003; McCann, 2003; Chandra et al., 2002; Ernst and Schmidt, 2002; Hollyer et al., 2002; Jewell and Young, 2002; Keating et al., 2002; Maats and Crowther, 2002; Niebyl and Goodwin, 2002; Al-Ari 2001; Power et al., 2001; Tsui et al., 2001; Wilkinson, 2000; Fischer-Rasmussen, et al., 1990).
- To prevent or reduce nausea and vomiting in postoperative patients (Barrett, 2004; Kraft and Hobbs, 2004; Visalyaputra et al., 1998; Arfeen et al., 1995; Phillips et al., 1993; Bone et al., 1990).
- To reduce vomiting in patients treated with cytotoxic compounds (Yamahara et al., 1989).
- To stimulate the appetite (Kraft and Hobbs, 2004; Schulz et al., 2001; Adame and Adame, 2000).
- To promote digestion and as an antifatulent or carminative to reduce gas and bloating (Lewis and Elvin-Lewis, 2003; Chevallier, 2000; Ody, 2000).
- For temporary relief and protection against gastrointestinal ulcers (McCann, 2003; Wu et al., 1990).

- To improve blood circulation (Chevallier, 2000; Ody, 2000).
- To lower blood glucose in the treatment of diabetes (Barnes et al., 2002; Mascolo et al., 1989).
- To lower or increase (depending on the dose) arterial tension (Barnes et al., 2002).
- As an anti-inflammatory against rheumatic pain and arthritis (Altmann and Marcussen, 2001; Bliddal et al., 2000).
- As a mild antipyretic to reduce fever (Ara, 1997).
- As a sialagogue, to promote salivation (Wichtl, 2004; Berdoncés, 1998).
- As a diaphoretic, to promote sweating (Chevallier, 2000).
- To treat cancer, due to its possible antitumorigenic effects (McCann, 2003).
- As a cholagogue, to promote the flow of bile into the intestine (Vanaclocha and Canigueral, 2003; Karch, 1999).
- To treat migraine headache (Metz and Cupp, 2000).
- Against sore throat and minor respiratory ailments (Gruenwald, 2004; Martinez, 1989).
- Ginger root, in large doses, has positive inotropic effects on the cardiovascular system (Skidmore –Roth, 2003).
- Topically, ginger preparations have been used for their antiseptic action (Chevallier, 2000; Ody, 2000).

### **Clinical Studies Employing Ginger**

- A number of clinical trials have been undertaken with diverse products containing ginger, with various results (Barrett, 2004; Westfall, 2004; Flake et al., 2003). Ernst and Pittler (2000) reviewed the literature related to various clinical trials involving ginger for the treatment of nausea and vomiting. Six trials satisfied their criteria for adequate methodology. The studies reviewed collectively favored ginger over placebo. The researchers concluded from the data, that ginger can be effective in the treatment of nausea and vomiting, although research into its long term effects is still warranted.
- In a recent literature review of 4 clinical trials employing ginger for the treatment of nausea and vomiting during pregnancy, the author concluded that the use of ginger is a safe and effective option comparable to vitamin B6 (Bryer, 2005).

- Both *in vitro* and animal experiments with ginger have shown that this plant possesses antioxidant action and can have a protective effect against free radical damage (Masuda et al., 2004; Ahmed et al., 2000).
- A ginger extract possesses anti tumor effects *in vitro* on certain cells infected with the Epstein-Barr virus (Vimala et al., 2000), as well as antioxidant effects that could have applications against certain types of cancer (Surh et al., 1998).
- Research in vitro has shown that ginger's active principles protect nerve cells and may have potential in the treatment of Alzheimer's disease (Kim et al., 2002).
- Researchers employing mouse adipocyte cell cultures have found that ginger may enhance insulin-sensitivity, and could be useful in the treatment of chronic diseases, such as diabetes (Sekiya et al., 2004).
- A crude extract of ginger (Zo.Cr) induced a dose-dependent (0.3-3 mg/kg) fall in the arterial blood pressure of anesthetized rats. The researchers concluded that ginger could an effective prospective treatment for hypertension in humans (Ghayur and Gilani, 2005).
- Animal studies have shown that gingerol, one ginger's main constituents, has both anti-inflammatory and analgesic effects (Young et al., 2005).
- A product composed of pycnogenol and standardized ginger root extract, known as Zinopin may be effective in the treatment of motion sickness, as well as preventing thrombo-embolism during long voyages in constrained spaces (Scurr and Gulati, 2004).

**Table 1. Selected Clinical Trials Employing Ginger\***

<b>Reference</b>	<b>Plant / Plant product</b>	<b>Purpose of study</b>	<b>Number of subjects</b>	<b>Results</b>
Manusirivithaya et al., 2004	Capsules containing ginger root powder given orally 1 g /day for 5 days	To determine ginger's antiemetic effects in cisplatin-induced emesis	48	Ginger did not show any statistically significant difference in efficacy compared to metoclopramide
Smith et al., 2004	Ginger 1.05 g	Comparison of ginger and Vitamin B6 in treating nausea and vomiting during pregnancy	291	Ginger was shown to be as effective as vitamin B6 in relieving nausea and vomiting
Eberhart et al., 2003	Powdered ginger capsules (2 different doses)	Post operative nausea	180	Not effective

Pongroj paw and Chiamchanya, 2003	Capsules containing 0.5 g of ginger powder	Post operative nausea	40	Effective
Portnoi et al., 2003	250 mg ginger capsules	To examine the safety and the effectiveness of ginger for nausea and vomiting during the first trimester of pregnancy	187	Ginger did not appear to increase the rates of major malformations and had a mild effect in the treatment of nausea and vomiting
Sripamote and Lekhyananda , 2003	500 mg of ginger, in capsules- orally	To compare the efficacy of ginger to vitamin B6 in the treatment of nausea and vomiting of pregnancy	138	Ginger was shown to be as effective as vitamin B6 for the treatment of nausea and vomiting
Willets et al., 2003	Ginger extract (EV.EXT35)	To evaluate the effect of a ginger extract on the symptoms of morning sickness in women less than 20 weeks pregnant	120	Effective
Keating and Chez, 2002	Ginger syrup (1 tablespoon, qid)	<i>Hyperemesis gravidarum</i> (nausea and vomiting during gestation)	26	Effective
Vutyavanich et al., 2001	Powdered fresh baked ginger root.	<i>Hyperemesis gravidarum</i> (nausea and vomiting during gestation)	70	Effective
Vislyaputra et al., 1998	Powdered ginger capsules, 4 per day	Post operative nausea	120	Not effective
Arfeen et al., 1995	Powdered ginger capsules, 1-2 per day	Post operative nausea	108	Not effective
Phillips et al., 1993	Powdered (500 mg) ginger capsules, 2 per day	Post operative nausea	120	Effective

Stewart, et al., 1991	Ground ginger root and powdered ginger capsules	Motion sickness	20	Not effective
Bone et al., 1990	Powdered (500 mg) ginger capsules, 1 per day	Post operative nausea	60	Effective
Fischer-Rasmussen et al., 1990	Powdered ginger capsules	<i>Hyperemesis gravidarum</i> (nausea and vomiting during gestation)	30	Effective

**\*Additional information about clinical trials and the products tested is available in the following publications:** Barrett, M. *Handbook of Clinically Tested Herbal Remedies* 2 Vols. New York: Haworth Herbal Press; 2004, Blumenthal, M. *ABC's Clinical Guide to Herbs*. New York: Thieme; 2003, Bratman S, Girman A. *Handbook of Herbal, Supplements and Their Therapeutic Uses*. St. Louis: Mosby; 2003, Bascom A. *Incorporating Herbal Medicine into Clinical Practice*. Philadelphia: F. A. Davis; 2002, Cassileth B, Lucarelli C. *Herb-Drug Interactions in Oncology*. London: BC Decker; 2003, McKenna et al., *Botanical Medicines*. New York: Haworth Herbal Press; 2002, Rotblatt M, Ziment I. *Evidence-Based Herbal Medicine*. Philadelphia: Hanley and Belfus; 2002, Mahady et al., *Botanical Dietary Supplements*. The Netherlands: Swets and Zeitlinger; 2001, Cupp M. *Toxicology and Clinical Pharmacology of Herbal Products*. Totowa, New Jersey: Humana Press; 2000; Werbach M, Murray M. *Botanical Influences on Illness* 2<sup>nd</sup> ed.; Tarzana CA: Third Line Press; 2000; Yarnell, E. et al., *Clinical Botanical Medicine*. New York: Mary Ann Liebert; 2003.



### Safety/Precautions

- Ginger is usually regarded as safe in small amounts, or approximately 2-4 grams per day (Bryer, 2005; Kraft and Hobbs, 2004; Wichtl, 2004; Libster, 2003; Chandra et al., 2002; Ernst and Pittler, 2000; Metz and Cupp, 2000), although certain precautions should be borne in mind, as follows:
- High doses (presumably more than 4 grams per day) of ginger may have uterine stimulating properties (Castleman, 2001). Do not use in pregnancy or lactation, unless prescribed by a health professional, as the possible effects on the developing fetus have not yet been fully ascertained (Wichtl, 2004; McCann, 2003; Vanaclocha and Cañiguel, 2003; Ernst and Schmidt, 2002; Al-Achi, 2001; Blumenthal, 1998).
- In one controlled study in humans, ginger ingested in various forms during pregnancy did not appear to increase the rates of major fetal malformations (Portnoi et al., 2003).
- In animal experiments, ginger has not shown any teratogenic effect when applied during pregnancy (Weidner and Sigwart, 1998). Curiously, Wilkinson (2001) found that ginger tea

applied orally to rats was not materno-toxic, but increased fetal loss, although augmenting growth in the surviving fetuses.

- In a human study, ginger showed no teratogenic effects (Fischer-Rasmussen, et al., 1990).
- In some experiments, ginger has not shown any mutagenic activity (Sivaswamy et al., 1991).
- Do not use in medicinal doses in patients with gallstones (cholelithiasis), as ginger's cholagogue effect may stimulate the gall bladder, worsening symptoms and causing unnecessary pain (Skenderi, 2003; Skidmore-Roth, 2003; Karch, 1999).
- It has been mentioned that ginger's components may inhibit thromboxane synthesis in vitro, thus interfering with normal blood clotting (Wichtl, 2004; Abebe, 2003; Backon, 1991; Srivastava, 1989). Although the putative anti-thrombotic activity of ginger in humans has not been proven (Janssen et al., 1996; Lumb, 1994), as a precaution, suspend the use of this herb two weeks before surgery (Robbers and Tyler, 2000).
- Large doses of ginger may cause cardiac arrhythmia and CNS depression (Gruenwald 2004), as well as heartburn (Castleman, 2001; McCann, 2003).
- Chinese herbalists differentiate between the use of fresh and dry ginger root, and suggest using caution in using dry ginger during pregnancy (Libster, 2003).
- Ginger overdose may cause arrhythmias and depression of the central nervous system (Cassileth and Lucarelli, 2003).

### **Potential Herb/Drug Interactions**

- Do not use concurrently with other plants or herbal products that may interfere with normal blood clotting, such as garlic, ginseng or ginkgo, for example (Abebe, 2002; Brinker, 2001).
- Do not use concurrently with drugs that interfere with blood clotting, such as aspirin, heparin or coumadin (warfarin) (Abebe, 2002; Brinker 2001; Miller, 1998).
- Patients under treatment with antiarrhythmic drugs or CNS depressants should observe caution if using ginger preparations (Cassileth and Lucarelli, 2003; McCann, 2003).
- Ginger may increase the absorption of other drugs taken orally (Skidmore-Roth, 2003).
- Ginger may antagonize activity of proton pump inhibitors and H<sub>2</sub> blockers by means of increased production of stomach acid (Cassileth and Lucarelli, 2003).
- If used against motion sickness, do not combine ginger with other medications for the same purpose, such as dimenhydrinate (Dramamine), since the possible interactions are currently unknown.

- Avoid taking concurrently with oral hypoglycemics, as some of ginger's constituents could theoretically potentiate the medication's effects (Cassileth and Lucarelli, 2003).

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