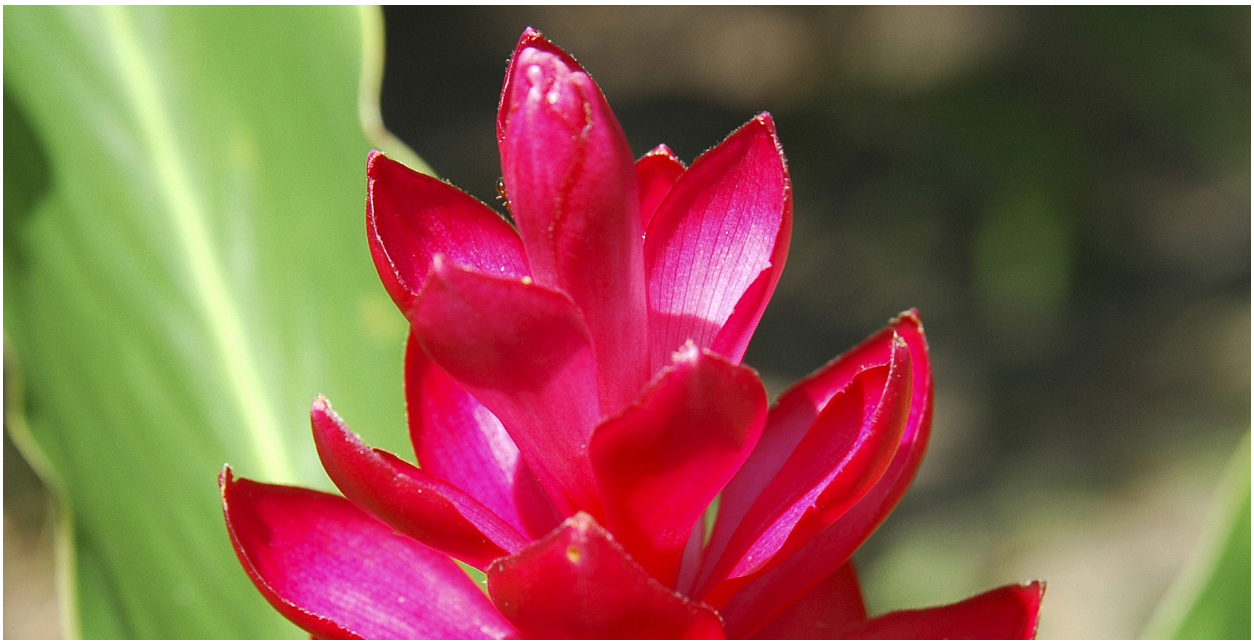
GINGER

(Zingiber officinale Roscoe)

An Overview of its Safety and Efficacy



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BACKGROUND AND USES

Ginger has been used as a spice and medicinal herb by numerous traditions across the world for thousands of years – including Traditional Chinese Medicine, Japanese, Ayurveda, Native American and European herbalism. The rhizome (or underground stem) of the ginger plant is the usable portion of the herb.

Ginger can be used orally, topically or even intramuscularly, although not all of these delivery systems have scientific evidence to support their use. The historical or theoretical uses for ginger span a broad range of symptoms and diseases and for multiple systems and organs in the body from A to Z. A small sampling of these includes acute bacterial dysentery, asthma, athlete's foot, headache, high blood pressure, laxative, menstrual cramps, psoriasis, stomach aches and ulcers, and upper respiratory infections. In the 9th and 10th centuries in Asia, ginger was recommended for stomachaches, diarrhea and nausea. In more modern times, it has been recommended for nausea, vomiting and slow digestion. In the U.S. it is commonly used for flatulence, nausea and as a seasoning or fragrance in foods, soaps and cosmetics.

MECHANISMS OF ACTION

The rhizome contains approximately 1-4% volatile oils, which are responsible for ginger's pungent odor and taste, and also contain the medicinal constituents. Of the volatile oils, the gingerols and shogaols have received the most research attention and either one of them can be used as a marker for standardization.

The gingerols and shogaols exhibit cardiodepressant activity[1] and ginger has been shown to inhibit platelet aggregation in vitro[2] but has had no effect in two human studies.[3, 4] Other cardiovascular research has demonstrated that oral ingestion of ginger extract can lower lipids and have anti-atherosclerotic effects in rabbits [5] and mice,[6] while also inhibiting the oxidation of LDL and preventing atherosclerosis in mice.[7]

The mechanism of action for the use of ginger on nausea and vomiting is not clear, but it may have to do antagonistic effects on 5-HT_3 receptors.[8]

DOCUMENTED EVIDENCE

Hyperemesis gravidarum, Nausea-Vomiting of Pregnancy

Several randomized controlled trials suggest that ginger may be both safe and effective for the nausea and vomiting associated with pregnancy. Nausea and vomiting are the most common unpleasant symptoms during pregnancy. 50% to 90% of women

experience these complications. Doses between 500 mg and 1,500 mg per day have been used, and some would advise that doses not greater than 1 gm per day be used due to the potential emmenagogue effects for ginger. However, there has been no reported scientific or medical contraindications for using ginger during pregnancy. [9]

A 2009 study was a single-blind controlled randomized clinical trial in women in Iran, up to 20 weeks of pregnancy. [10] 32 women received ginger and 35 received placebo. One ginger (250 mg) or placebo capsule four times per day was given over the course of four days. Women were also asked to record nausea intensity twice a day. At the end of four days, a researcher completed the questionnaire based on the women's responses. Nausea intensity improved in 84% of those who used the ginger and in 56% of the women in the control group. The incidence of vomiting in the control group was 9% decreased and 50% decreased in the ginger group. This study showed not only a positive effect, but women were satisfied with the effect and no complications were observed during the treatment period.

At least four previously published randomized, controlled trials prior to the 2009 study have shown success in the use of ginger for nausea and vomiting of pregnancy. Doses of 1,000 mg – 1,500 mg per day have been used previously. In 2003, the efficacy of ginger was compared to vitamin B6.[11] Women with nausea and vomiting of pregnancy received either 500 mg of ginger or 10 mg of B6 per day for 3 days. Both ginger and vitamin B6 significantly reduced the average nausea scores, ginger from 5.0 to 3.6 and vitamin B6 from 5.3 to 3.3, which was not considered statistically significantly different. There was no placebo group.

In women who were fewer than 20 weeks pregnant, a ginger extract was tested on 120 women with morning sickness. Women received either 125 mg of the extract, which was equivalent to 1.5 gm per day of dried ginger, or placebo, four times per day for 4 days. Significant decreases in nausea were seen in the ginger extract group, but no significant differences were seen between the ginger and the placebo group in vomiting. [12] Nausea scores were significantly reduced and the number of vomiting episodes were significantly decreased when compared to placebo in 70 women at or before 17 weeks of gestation when taking 1 gm/day of ginger for 4 days. [13]

An earlier study in 1990 studied 30 women with hyperemesis gravidarum.[14] Women were given 250 mg of ginger for days and followed by a 2 day washout, or placebo lactose four times daily for 4 days. When women were taking the ginger, they experienced a significant improvement in their symptoms compared to placebo.

Chemotherapy Induced Nausea

There has also been a small amount of research studying the use of ginger for chemotherapy induced nausea. One randomized controlled trial examined the effect of

ginger in 41 patients with leukemia and chemotherapy induced nausea.[15] The control group was given an infection of Compazine and the other group was given doses of ginger capsules although the dose was not stated, as an adjunct to the Compazine injection, over the course of two days. The combination of the two treatments demonstrated a significant decrease in the severity and duration of the nausea, although there was no difference in the severity and duration of vomiting.

A small case series of 11 patients with T-cell lymphoma and frequent nausea found that 530 mg capsules given prior to their chemotherapy agent reduced their nausea by two thirds. [16]

Postoperative Nausea and Vomiting

Postoperative nausea is another potential area where ginger might be helpful in reducing nausea and/or vomiting, however, research has been mixed in the results. A systematic review was published in 2000, in which six randomized, double-blind, placebo-controlled trials met the inclusion criteria, but only three studies were of ginger and it's ability to prevent postoperative nausea and vomiting. [17] Two of the three ginger studies in that review were positive and one was negative. The first positive study was in 120 women undergoing laparoscopic surgery and 3 different groups compared 10 mg of oral metoclopramide, versus 1gm of powdered ginger, versus placebo.[18] Each treatment was given 1 hour prior to anesthesia. The incidence of postoperative nausea was 27% in the metoclopramide group, 21% in the ginger group and 41% in the placebo group. Antiemetics were needed by 32% of those being treated with metoclopramide, 38% of those on placebo and only 15% of those who took ginger, suggesting the ginger was similarly effective to metoclopramide in reducing postoperative nausea and vomiting. The second positive study was a controlled trial of ginger versus metoclopramide in women having a major gynecologic surgery. [19] The ginger group received 1 gm per day of ginger and a placebo injection and another received an oral placebo and 10 mg of IV metoclopramide, while another group received oral and injection placebo. Results showed that preoperative ginger was as effective as preoperative metoclopramide and both were superior to placebo in the treatment of postoperative nausea. The incidence of vomiting was not reported.

Motion Sickness

It has been hoped that ginger might also affect the nausea, vomiting and vertigo associated with motion sickness. There have been several studies using ginger for this purpose. Only one of the studies appeared to reduce the vomiting and cold sweating but not the nausea or vertigo when navy cadets were taking either placebo or 1gm/day of ginger while on an ocean vessel.[20] The other five studies showed no effect for motion sickness and ginger. [21, 22 , 23, 24, 25]

Menstrual Cramps (Dysmennorhea)

An important study of ginger and women's health is it's role in treating acute menstrual cramps. One hundred and fifty reproductive aged women with primary dysmenorrhea (menstrual cramps) were divided into three groups, in a double-blind clinical trial.[26] Group 1 received ginger rhizome powder capsules, 250 mg four times a day for three days starting day one of their menses. The second group received 250 mg mefenamic acid capsules, four times daily, days one through three, and the third group took 400 mg ibuprofen capsules four times daily, days one through three of the menses. Assessment was performed after one menstrual period. At the end of treatment, the severity of dysmenorrhea decreased in all groups and no differences were found between the groups in pain severity, pain relief or satisfaction. More women in the ginger group became completely pain free, versus the mefenamic acid and ibuprofen groups.
The cause of menstrual cramps is thought to be due to an increased production of prostaglandins in the endometrium (lining of the uterus). Both mefenamic acid and ibuprofen act as inhibitors of the synthesis of these prostaglandins. It is thought that the anti-inflammatory properties of ginger are due to the gingerols, also leading to a prostaglandin reduction as well as some inflammatory substances.

Osteoarthritis and Rheumatoid Arthritis

The effectiveness of ginger for joint pain, whether it be osteoarthritis or rheumatoid arthritis, is as yet unclear. One randomized, controlled trial initially found that ginger had no effect on relieving symptoms of osteoarthritis.[27] However, when the data was reviewed again with a different analytical method, ginger at 255 mg of concentrated ginger extract twice daily, did have a small effect on reducing knee pain while standing, better than the placebo group.

Another small controlled, double-blind crossover study was conducted in 75 individuals with knee and hip osteoarthritis.[28] There were no significant differences between each of the groups in any of the measures of function. The study did find that ibuprofen for the first 3 weeks and then ginger for 3 weeks were more effective than placebo. However, the 1 week washout period between each group was likely inadequate, suggesting a possible carry-over effect from the ibuprofen to the ginger and thus a null study result.

Promising results were seen in a case series report of ginger in 56 individuals with rheumatoid arthritis, osteoarthritis or muscular discomfort.[29] Most of the patients took 0.5 to 1 tsp of powdered ginger root each day, and 75% with either type of arthritis experienced pain relief and swelling to at least some degree. In the patients with just muscular discomfort, all reported relief of their pain after taking ginger. This study suffers from a lack of a placebo group, but is positive in its findings.

PRECAUTIONS AND CONTRAINDICATIONS

Ginger is on the U.S. FDAs GRAS (generally recognized as safe) list.

Ginger may increase bleeding by inhibiting thromboxane synthetase and inducing prostacyclin. For this reason, it should be used cautiously prior to surgery and cautiously or not at all with anti-coagulant medications.[30, 31]

Ginger should also be used cautiously in individuals with gastric or duodenal ulcers due to heartburn, and gastric and esophageal irritation, especially in non-encapsulated products.

Some individuals will have allergies to ginger and others in the same plant family.

Drug/Herb/Supplement Interactions

- Ginger may interfere with antacids, H-2 antagonists or proton pump inhibitors due its potential of increasing stomach acid production.
- In theory, ginger may enhance the effect of anti-coagulants and increase the risk of bleeding. Thus, concurrent use of ginger with anti-coagulants (whether pharmaceutical, herbal or nutraceutical) , anti-platelet drugs and NSAIDS may increase the risk of bleeding.
- Large doses of ginger may depress the central nervous system (CNS) and again, in theory, may enhance the effects of barbiturates, benzodiazepines and CNS depressants.
- Ginger may have a dose-dependent inotropic effect and therefore may theoretically interfere with digoxin, beta-blockers or other positive inotropic agents.
- While studies are lacking, there are some potential for hypoglycemic effects of ginger and it therefore may theoretically interfere/enhance glucose lowering medications.

DOSING

General: Ginger can be used as a powder, tablet, capsule, tea, tincture or fresh-cut and raw. General doses of any of these are 1 to 4 g/day and best in divided doses when being dosed for treatment.

Post-operative nausea: Although caution is advised for pre-surgery due to the potential for inhibition of platelet aggregation, based on the studies mentioned in this paper, the dose is 1 gm of ginger one hour prior to surgery.

Nausea/vomiting of pregnancy: 1-2 gm/day in divided doses

Motion sickness: 1-2 gm daily in divided doses

Arthritis: 1-2 gm/day of powdered ginger in divided doses

SUMMARY

This paper has focused on the most prominent scientific research for the therapeutic use of ginger root. However, while lacking scientific evidence, there is a large body of historical and theoretical uses of ginger. Select cultures and folklore has used ginger for a very broad range of conditions from simple flatulence, diarrhea and dyspepsia to the complex conditions of asthma, cancer and heart disease. While a simple herb, and mostly only used as a seasoning in the U.S., other parts of the world have been keen on ginger for centuries as not only an important part of their cuisine, but as an important medicinal agent. Continued research will enhance our understanding and expand the scientific use of ginger to treat acute and chronic health care problems.

ABOUT THE AUTHOR

Dr. Tori Hudson, Naturopathic Physician, graduated from the National College of Naturopathic Medicine (NCNM) in 1984 and has served the college in several capacities, including: Medical Director, Associate Academic Dean, and Academic Dean. She is currently a clinical professor at The National College of Naturopathic Medicine (NCNM), Southwest College of Naturopathic Medicine and Bastyr University. Dr Hudson has been in practice for 28 years, is the medical director of her clinic, “A Woman’s Time” in Portland, Oregon, and director of product research and education for VITANICA.

Dr. Hudson was awarded the 1990 President’s award from the American Association of Naturopathic Physicians for her research in women’s health, the 1999 prestigious Naturopathic Physician of the Year award , he 2003 NCNM Alumni Pioneer Award., and the 2009 Natural Products Association Pioneer Award.

She is a nationally recognized author (book: Women’s Encyclopedia of Natural Medicine second edition, McGraw Hill 2008), speaker, educator, researcher, and clinician. Dr. Hudson serves on several editorial boards, advisory panels and as a consultant to the natural products industry.

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