Ginger - *Zingiber officinale*

Common Indications

- Nausea and vomiting from any source
- Gastric distress
- Antioxidant and anti-inflammatory
- Arthritis
- Infection
- Chemoprotection

General Comments

Ginger has a long history of use not only in cooking but as a medicinal herb. There is a large body of research and it continue to this day looking at ginger for a host of issues including use in cancer and as chemoprotective.

Benefits & Mechanism of Action

Nausea and vomiting associated with chemotherapy, surgery, motion sickness or pregnancy.

Ginger's antiemetic activity has been compared to both drug and placebo and shown effectiveness. [1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17] Ginger was compared to Dramamine (dimenhydrinate) in a double blind randomized controlled trial of 170 pregnant women and found to be just as effective.[18] It also presented fewer side effects and caused less drowsiness as it relieved nausea. A sperate meta-analysis also proved its merit in easing nausea and vomiting. [19]

Ginger has been studied in chemotherapy patients with good results. [11,20,21,22] Ginger was found to be more effective than Zofran (odansetron) in chemotherapy patients receiving cisplatin. Ginger decreased the delay in gastric emptying times. When given with a small meal, ginger was shown helpful in reducing nausea and the need for medication.[23]

Hyperemesis gravidarum occurrence in pregnancy has also been studied with good impact. When compared to Reglan (metoclopramide) for surgically induced

nausea, Ginger had good impact reducing nausea and vomiting.

Antioxidant

Ginger has shown significant antioxidant effects both directly and indirectly. One study showed that ginger significanly lowered free radical levels and increased the activity of endogenous antioxidants superoxide dismutase and catalase.[25] Ginger also demonstrated a sparing effect on vitamins C and E.[25] It also protects against lipid peroxidation in the liver and kidney.[26,27]

Inflammation; may be used for inflammatory conditions such as arthritis.

Ginger's structural phenols are anti- inflammatory may have an effect on lipopolysaccharide induced COX-2 and PGE2 production.[28] In animal studies, aqueous extract of ginger significantly lowered thromboxane B2 levels and serum PGE_2.[29] Ginger also inhibits 5-lipoxygenase and thromboxane synthase.[31] Genes that encode for cytokines, chemokines, and the inducible enxyme COX-2 have been inhibited with ginger supplementation.[30,31]

Multiple compounds in ginger contribute to the anti-inflammatory effect. Constituents include gingerols, shogaols, gingerenone A, 6-gingerdiol, hexahydrocurcumin, zingerone, diarylheptanoids, and gingerdione.[32,33,34] Gingerol and 8-gingerol showed capsaicin-like effects on intracellular Ca^{2+} ion currents and are considered a valid alternative to topical capsaicin.[35,36]

Gastroprotection

Ginger increases saliva, bile and gastric secretions.[37,38,39] In both animal and human studies, ginger increased gastrointestinal motility, accelerated gastric emptying, and stimulated antral contractions.[10,40,41] Ginger has cholinergic agonistic activity on M_3 receptors in the gut, postsynaptically, and inhibititory effects presynaptically.[42] When used to treat occasional diarrhea, the mechanism is likely modification of bacterial cell walls and human epithelial cells, discouraging colonization.[43]

Infection

In vivo and in vitro studies of ginger have show efficacy against bacteria and parasites. Ginger therapy was effective against *Staphylococcus aureus, Streptococcus pyogenes, Streptocuccus pneumoniae, Haemophilus, Penicillium spp., Escherichia coli, Bacillus subtilis, Helicobacter pylori*, and the larvae of mosquito associated with dengue fever, *Aedes aegypti*.[44,45,46,47,48,49] There are also studies showing antiviral and antifungal effects with additional activity of preventing plaque formation.[48,50,51,52,53]

Chemoprotection

Ginger has shown chemoprotective effects in both human and animal models. There is demonstrated evidence of inhibition in breast cancer, ovarian, promyelocitic leukemia, prostate, colon, and pancreatic cancer cell lines.[54,55,56,57,58,59,60,61,62] Ginger has apoptotic activity and reduces proliferation and cell transformation.[63] 6-gingerol, 6-paradol, shogaols, zerumbone and zingerone have antitumor properties.[64] Mechanism activity includes modulation of proteins involved in apoptosis, arrested development in the sub-G1 phase, angiogenesis inhibition from reduced blood supply, intracellular oxidative stress mediated cascade, and down-regulation of transcription by NF-kappaB activation.[54,61,65,66,67]

Dose:

General

- Standardized extract - 75 to 2000mg in divided doses with food
- Fresh root - 1 to 4gm of the fresh root daily in divided doses
- Liquid extract (1:2) - 0.7 to 4 ml/day
- Dried root - 1 to 3 grams daily in divided doses
- Infusion - 4 to 6 slices of fresh ginger steeped in boiling water for 30 minutes

Pediatric (ages 6-12)

- Use 1/3 of adult dosage

Note: There are various products with different dosages and standardizations to choose from. When choosing a dietary supplement, select those from reputable manufacturers.

Standardization:

Ginger supplements should be standardized to contain 4% volatile oils or 5% total pungent compounds including 6-gingerol and/or 6-shogaol.

Cautions & Side Effects:

Ginger has been reported to be safe in recommended doses. Common minor adverse effects include heartburn, bloating, and dermatitis of fingertips with topical use.

Medications with increased effects while taking ginger include:

- Anticoagulant medications[68]
- Procardia - case reported[69]
- Antibiotics[70]

Patients with the following disease states or conditions should use ginger:

- Bleeding disorders

- Gastric ulcers
- GERD
- Gallstones

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Nausea and Vomiting

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