

# Ginger: An Overview

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Ginger (*Zingiber officinale*) is one of the more commonly used herbal supplements. Although often consumed for culinary purposes, it is taken by many patients to treat a variety of conditions. Ginger has been shown to be effective for pregnancy-induced and postoperative nausea and vomiting. There is less evidence to support its use for motion sickness or other types of nausea and vomiting. Mixed results have been found in limited studies of ginger for the treatment of arthritis symptoms. (Am Fam Physician 2007;75:1689-91. Copyright © 2007 American Academy of Family Physicians.)

**G**inger (*Zingiber officinale*) is a member of the family of plants that includes cardamom and turmeric. The strong aroma of ginger is the result of pungent ketones including gingerol, the extract that primarily has been used in research studies. The consumed portion of the ginger plant is the rhizome, often called “ginger root,” although it is not actually a root. The rhizome is the horizontal stem of the plant that sends out the roots.

Ginger is grown primarily in Asia and tropical areas and, in addition to its culinary function, has been used since ancient times for a variety of conditions, including colds, fevers, and digestive problems, and as an appetite stimulant. It is categorized by the U.S. Food and Drug Administration as a food additive but has been studied as a treatment for nausea and vomiting, as well as for arthritis (for which it has shown mixed results).

## Pharmacology

The exact mechanism of action of ginger in relation to its antiemetic properties is unclear, although it appears to inhibit serotonin receptors and to exert antiemetic effects at the level of the gastrointestinal system and in the central nervous system.<sup>1</sup> In relation to its potential anti-inflammatory properties, ginger extract has been shown to inhibit the activation of tumor necrosis factor  $\alpha$  and cyclooxygenase-2 expression during in vitro studies of human synoviocytes.<sup>2</sup>

## Uses and Effectiveness

Ginger has been evaluated as a treatment for various conditions, including motion sickness, nausea and vomiting, and arthritis.

### MOTION SICKNESS

Ginger was found in one study to be superior to dimenhydrinate (Dramamine) and placebo for symptoms of motion sickness.<sup>3</sup> A follow-up study also found that 1 g of ginger was effective at reducing the subjective severity of seasickness in naval cadets on the high seas, although the results were not statistically significant.<sup>4</sup> Ginger did not reduce the number of participants reporting vertigo. Other research has shown no benefit of ginger for motion sickness.<sup>5,6</sup>

### NAUSEA AND VOMITING

*Pregnancy-Induced.* A review in 2005 analyzed 33 studies to evaluate the effectiveness of ginger in the treatment of pregnancy-induced nausea and vomiting.<sup>7</sup> Only six studies, with a total of 675 participants, met the inclusion criteria, being double-blind, randomized controlled trials (RCTs). Four of these studies showed ginger to be superior to placebo, and two showed it to be comparable in effectiveness to vitamin B<sub>6</sub>, which has been found to be effective in pregnancy-induced nausea. There were no adverse effects of ginger on pregnancy outcomes.<sup>7</sup> A Cochrane review also concluded that ginger was beneficial for nausea and vomiting in pregnancy.<sup>8</sup>

**SORT: KEY RECOMMENDATIONS FOR PRACTICE**

<i>Clinical recommendation</i>	<i>Evidence rating</i>	<i>References</i>
Oral ginger is thought to be safe and is probably effective in the treatment of pregnancy-induced nausea and vomiting.	B	7, 8
Oral ginger may be effective in the treatment of postoperative nausea and vomiting.	B	9

*A = consistent, good-quality patient-oriented evidence; B = inconsistent or limited-quality patient-oriented evidence; C = consensus, disease-oriented evidence, usual practice, expert opinion, or case series. For information about the SORT evidence rating system, see page 1605 or <http://www.aafp.org/afpsort.xml>.*

*Postoperative.* A 2006 meta-analysis evaluating the use of ginger for postoperative nausea and vomiting showed that, in five randomized trials with a total of 363 patients, ginger was more effective than placebo.<sup>9</sup>

*Other.* In relation to chemotherapy-induced nausea and vomiting, the addition of ginger to the standard antiemetic regimen had no advantage in reducing nausea or vomiting in the acute phase of cisplatin (Platinol)-induced emesis.<sup>10</sup> A systematic review of six RCTs analyzing ginger for clinical nausea and vomiting found insufficient data to draw firm conclusions.<sup>11</sup>

**ARTHRITIS**

Studies evaluating the effectiveness of ginger in patients with osteoarthritis have had mixed results. Whereas one study showed ginger extract to have a statistically significant effect on reducing symptoms of osteoarthritis of the knee,<sup>12</sup> in a separate crossover study the effect of ginger in osteoarthritis was significant only in the first period of treatment (i.e., before crossover).<sup>13</sup> In a retrospective case series involving 28 patients with rheumatoid arthritis, 18 with osteoarthritis, and 10 with muscular discomfort, patients taking powdered ginger subjectively described relief in pain and swelling.<sup>14</sup>

**VASCULAR CONDITIONS**

Although one study has shown that ginger does not affect the International Normalized Ratio (INR),<sup>15</sup> another study demonstrated a significant increase in fibrinolytic activity

after dietary supplementation with 5 g of ginger powder.<sup>16</sup>

**OTHER REPORTED USES**

Ginger has been studied extensively in animal and in vitro models, leading to speculation for its use as an antioxidant, antimicrobial, antifungal, antineoplastic, and antihypertensive agent. However, none of these potential uses have been studied in humans.

**Adverse Effects and Interactions**

Adverse effects after ingestion of ginger are uncommon, but they can include mild gastrointestinal effects such as heartburn, diarrhea, and irritation of the mouth.<sup>12</sup> Because there is a possibility that ginger may affect fibrinolytic activity, it may be prudent for patients taking anticoagulants such as warfarin (Coumadin) to exercise caution. Physicians caring for patients who take warfarin and begin to use high doses of ginger should consider monitoring the INR response.

Ginger has been reported to have positive inotropic effects in animal models and has also led to case reports of arrhythmia.<sup>17</sup> Although there have been no reports of toxic effects from ginger after human consumption, more research analyzing adverse reactions and potential drug interactions needs to be performed.

**Dosage**

Ginger can be consumed as a fresh or dried root and is often prepared in teas, soft drinks (including ales), and breads. No specific dosing studies have been performed; however, most clinical research has used between 250 mg and 1 g of the powdered root in capsular form, taken one to four times daily.<sup>7,9,11</sup> For pregnancy-induced nausea and vomiting, most research studies used 250 mg four times daily.<sup>7</sup>

Rubbing the oil of ginger into painful joints and inhaling the fumes in steamed water have been advocated, although these techniques have not been studied.

**Final Comment**

Given that many antiemetic medications have the potential for sedation as a side effect, the

**Table 1. Ginger: Key Points**

Effectiveness	Positive effect: pregnancy-induced and postoperative nausea and vomiting <sup>7-9</sup> No consistent effect: osteoarthritis, <sup>12-14</sup> rheumatoid arthritis, <sup>14</sup> motion sickness <sup>3-6</sup>
Safety	Adverse effects: uncommon, but may include heartburn, diarrhea, mouth irritation <sup>12</sup> ; may increase risk of fibrinolysis Interactions: insufficient data on drug interactions; may be prudent to exercise caution when taken in high doses with anticoagulants such as warfarin (Coumadin)
Dosage	Dried powder: 250 mg to 1 g, one to four times daily <sup>7,9,11</sup>
Cost	\$5 to \$20 per month, depending on form and brand
Bottom line	Ginger is safe, and it probably is effective for pregnancy-induced and postoperative nausea and vomiting

Information from references 3 through 9 and 11 through 14.

use of ginger is a reasonable and safe alternative to treat pregnancy-induced nausea and vomiting. Ginger may also play an adjunctive role in the treatment of postoperative nausea and vomiting, for which it has been shown to be effective. Benefits of ginger for other forms of nausea and vomiting have not been demonstrated in research studies. More research needs to be performed to clarify its role, if any, in the treatment of various forms of arthritis. The effectiveness, safety, dosage, and cost of ginger are outlined in *Table 1*.<sup>3-9,11-14</sup>

Members of various family medicine departments develop articles for "Complementary and Alternative Medicine." This is one in a series coordinated by Sumi Sexton, MD.

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Author disclosure: Nothing to disclose.

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