Clinical Studies on Ginger (*Zingiber officinale* Roscoe)

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<tr>
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<tr>
<td>Careddu et al., 1999</td>
<td>Children with history of motion sickness</td>
<td>R, DB, Cm</td>
<td>Ages 3–6 years: 250 mg 1/2 hour before trip, followed by 250 mg every 4 hours as necessary; 6 years and older: 500 mg using above formula; or 1/2–1 capsule (12.5–25 mg) dimenhydrinate 1/2 hour before the trip and if necessary 1 capsule every 4 hours</td>
<td>Zintona® vs. dimenhydrinate</td>
<td>Significantly better therapeutic effectiveness in ginger-treated group than dimenhydrinate-treated group. Physician ratings reported good results in 100% of subjects taking ginger, and 31% of subjects taking dimenhydrinate. Ginger reduced symptoms within 30 minutes, and this difference was highly significant (p&lt;0.0001). None of the children taking ginger had any adverse side effects, while 69% of cases in the dimenhydrinate group had adverse effects from the drug, and this difference was also highly significant (p&lt;0.0001).</td>
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<tr>
<td>Riebenfeld and Borzone, 1999</td>
<td>Sea sickness in passengers on a cruise ship</td>
<td>R, DB, Cm</td>
<td>7 months</td>
<td>500 mg, 1/2 hour before embarkation, followed by 500 mg every 4 hours over a 48-hour period, or 100 mg of dimenhydrinate, 1/2 hour before embarkation followed by 100 mg every 4 hours over a 48-hour period</td>
<td>Zintona® vs dimenhydrinate</td>
<td>Significantly improved total motion sickness score (p&lt;0.005). Ginger is as effective as dimenhydrinate for treatment of motion sickness, with greater tolerability and lower incidence (13.3% vs. 40%) of side effects (p&lt;0.001).</td>
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<td>Schmid et al., 1994</td>
<td>Sea sickness in tourists on a whale-watching safari</td>
<td>R, DB, Cm</td>
<td>3 months</td>
<td>Group 1: 500 mg, 2 hours prior to departure, 500 mg, during trip, if needed. Group 2: 500 mg, after dinner on evening before trip, 500 mg, 2 hours prior to departure</td>
<td>Zintona®</td>
<td>Ginger showed equal potency to 7 common pharmaceutical drugs for sea sickness, and better effectiveness than scopolamine transdermal patch (p=0.14). As neither clinically relevant nor significant differences were found between products used, personal preference should be followed as to the medication taken as prophylaxis for seasickness.</td>
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<tr>
<td>Stewart et al., 1991</td>
<td>Motion sickness and gastric function</td>
<td>PC, Cm, Phase 1 motion sickness, n=8; Phase 2 motion sickness, n=8; Phase 3 motion sickness, n=4; Phase 4 gastric function, n=8</td>
<td>14 hours</td>
<td>Phase 1: 500 mg or 1,000 mg ground ginger root or 0.6 mg scopolamine HBr or placebo on separate test days; Phase 2: One 1,000 mg fresh ginger root capsule or placebo Phase 3: 940 mg ground ginger root or placebo Phase 4: Two, 250 mg capsules ginger or placebo</td>
<td></td>
<td>Powdered ginger partially inhibited tachygastria but did not enhance the EGG amplitude. Did not significantly alter gastric function during motion sickness or possess antimotion sickness activity.</td>
</tr>
<tr>
<td>Grøntved et al., 1988</td>
<td>Seasickness in naval cadets unaccustomed to sailing</td>
<td>R, DB, PC n=80 (median age 17 years)</td>
<td>4 hours</td>
<td>1 g</td>
<td>Powdered ginger capsules (brand not stated) vs. placebo</td>
<td>Ginger significantly reduced tendency to vomit and experience cold sweats (p&lt;0.05). No side effects reported in both groups.</td>
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<tr>
<td>Grøntved and Hentzer, 1986</td>
<td>Vertigo and nystagmus (healthy volunteers who received caloric stimulation of the vestibular system)</td>
<td>R, DB, CO, PC n=48</td>
<td>6 days</td>
<td>1 g/day</td>
<td>Powdered ginger capsules (brand not stated)</td>
<td>Ginger significantly reduced the induced vertigo better than placebo (p&lt;0.05). No statistically significant action upon the duration or maximum slow phase velocity of nystagmus.</td>
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<tr>
<td>Mowrey and Clayson, 1982</td>
<td>Motion sickness produced by a motor driven, tilted, revolving chair</td>
<td>R, Cm, PC, SB n=36 volunteer subjects with self-rated extreme or very high susceptibility to motion sickness (ages 18–20 years)</td>
<td>31 minutes</td>
<td>Single dose of 2 capsules (940 mg total)</td>
<td>Powdered ginger capsules (brand not stated)</td>
<td>Ginger is superior to both placebo and dimenhydrinate (p&lt;0.05) in preventing the gastrointestinal symptoms of experimentally-induced motion sickness in highly susceptible individuals.</td>
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## Nausea During Pregnancy

| Author/Year          | Subject                                           | Design                              | Duration | Dosage | Preparation                                      | Results/Conclusion                                                                 |
|----------------------|---------------------------------------------------|                                     |          |        |                                                 |                                                                                 |
| Vutyavanich et al., 2001 | Hyperemesis gravidarum (women with nausea and vomiting in early pregnancy) | R, DB, PC, n=70                      | 7 days   | One, 250 mg capsule 4x/day                      | Fresh, baked ginger root ground into powder (prepared by researchers)            | Significant median change in nausea scores with ginger post-therapy (p=0.014). Significant reduction in nausea scores with ginger on day 4 of only treatment (p=0.0348). Significant improvement in patients’ subjective response with ginger (p<0.001). No adverse effect with ginger on pregnancy outcomes. |
| Fischer-Rasmussen et al., 1990 | Hyperemesis gravidarum | R, DB, CO n=30 pregnant women admitted to hospital before 20 weeks of gestation with symptoms 2x/day (ages 18–39 years) | 4 days | One, 250 mg capsule 4x/day                      | Powdered ginger capsules (brand not stated)                                      | Ginger diminished or eliminated symptoms of hyperemesis gravidarum. Statistically significant preference for ginger. Reduced degree of nausea and number of attacks of vomiting. No side effects observed. |

## Postoperative Nausea

| Author/Year          | Subject                                           | Design                              | Duration | Dosage | Preparation                                      | Results/Conclusion                                                                 |
|----------------------|---------------------------------------------------|                                     |          |        |                                                 |                                                                                 |
| Vislyaputra et al., 1998 | Gynecological diagnostic laparoscopy | R, DB, PC, Cm n=120 (ages 20–40 years) | 24 hours | Four, 500 mg capsules ginger, or 1.25 mg droperidol, or placebo | Powdered ginger capsules (prepared by researchers) vs. placebo vs. droperidol IV | No significant reduction in incidence of postoperative nausea and vomiting. Severity of nausea and frequency of vomiting within 24 hours were not statistically different with ginger root capsules or the combination of ginger root and droperidol. |
| Arfeen et al., 1995  | Day case gynecological laparoscopy | R, DB, PC n=108 (ages 18–75 years) | 3 hours | One-time dose before surgery of 10 mg diazepam (orally) plus either 1–2 capsules (500 mg ea.) powdered ginger or placebo | Blackmores Ltd. BP 1988 custom powdered ginger capsules vs. placebo | Ginger in doses of 0.5 or 1.0 g given with oral diazepam premedication one hour prior to surgery was found ineffective in reducing the incidence of postoperative nausea and vomiting. Incidence of nausea and vomiting increased slightly but insignificantly (nausea, p=0.2; vomiting, p=0.13), with increasing dose of ginger. |
| Phillips et al., 1993 | Day case gynecological laparoscopy | R, R, DB, PC, Cm n=120 (ages >16 years) | 24 hours | Two, 500 mg capsules ginger, or 10 mg metoclopramide | Martindale Pharmaceuticals powdered ginger capsules vs. placebo vs. metoclopramide | Ginger similarly reduced incidence of nausea and vomiting as metoclopramide. Oral administration of 1 g of ginger reduced incidence of nausea and vomiting by 50% and appears to be as effective as metoclopramide, 10 mg when given by mouth one hour before anesthesia. Ginger is an effective and promising prophylactic antiemetic without toxic effects, which may be especially useful in day case surgery. |
| Bone et al., 1990    | Major gynecological surgery                      | R, DB, PC, Cm n=60 (ages 16–65 years) | 24 hours | 0.5 g ginger or 10 mg metoclopramide injection or placebo | Powdered ginger capsules (brand not stated) vs. placebo vs. metoclopramide | Statistically fewer recorded incidences of nausea for ginger compared with placebo (p=0.05). Numbers of incidences of nausea in ginger vs. metoclopramide groups were similar. |

### Cardiovascular

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<tr>
<td>Bordia et al., 1997</td>
<td>Platelet aggregation in patients with coronary artery disease with history of myocardial infarction (76 months)</td>
<td>PC, n=60</td>
<td>3 months</td>
<td>4 g ginger daily for 3 months or single dose of 10 g ginger vs. 5 g (2 x 2.5 g) fenugreek daily for 3 months vs. placebo</td>
<td>Powdered ginger capsules (prepared by researchers) vs. fenugreek vs. placebo</td>
<td>Powdered ginger in dose of 4 g/day did not affect ADP and epinephrine-induced platelet aggregation. However, single dose of 10 g powdered ginger after 4 hours produced a significant reduction in platelet aggregation (p&lt;0.05).</td>
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<td>Janssen et al., 1996</td>
<td>Platelet thromboxane production</td>
<td>R, PC multiple CO n=18 healthy volunteers (mean age 22 years)</td>
<td>3 x 2 weeks</td>
<td>15 g daily raw ginger root vs. 40 g daily stem ginger</td>
<td>Vanilla custard with either 15 g raw ginger root or 40 g stem ginger</td>
<td>Daily treatment with either 15 g ginger root or 40 g stem ginger mixed in custard for 14 days did not affect maximum ex vivo platelet thromboxane B2 production (p=0.616).</td>
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<tr>
<td>Lumb, 1994</td>
<td>Platelet function</td>
<td>R, DB, PC, CO n=8 healthy male volunteers</td>
<td>24 hours</td>
<td>Single dose of 4 capsules (2 g total) dried ginger powder</td>
<td>Dried ginger power (capsules prepared by researchers)</td>
<td>No significant differences in bleeding time, platelet count, or platelet aggregation. 2 g dried ginger unlikely to cause platelet dysfunction when used therapeutically.</td>
</tr>
<tr>
<td>Verma et al., 1993</td>
<td>Platelet aggregation induced by fatty diet (fed 100 g butter x 7 days)</td>
<td>R, PC n=20 healthy males (ages 30–50 years)</td>
<td>1 week</td>
<td>Four, 625 mg capsules 2x/day with meals</td>
<td>Powdered ginger capsules, 625 mg (prepared by researchers)</td>
<td>Ginger significantly decreased platelet aggregation (p&lt;0.001) when taken with fatty meals. Serum cholesterol and triglyceride levels remained unchanged from ginger.</td>
</tr>
<tr>
<td>Srivastava, 1989</td>
<td>Thromboxane synthesis</td>
<td>CC, Cm n=12</td>
<td>1 week</td>
<td>5 g/day Raw fresh ginger</td>
<td>Ginger inhibited eicosanoid biosynthesis. Ginger consumption produced 37% inhibition (p&lt;0.1) on TxB2 production in serum.</td>
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### Other

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<td>Altman and Marcussen, 2001</td>
<td>Osteoarthritis (OA) of the knee</td>
<td>R, DB, PC, MC, PG n=247 men and women with OA of the knee (ages ≥ 18 years)</td>
<td>6 weeks preceded by 1 week washout period</td>
<td>One, 255 mg capsule 2x/day or placebo</td>
<td>EV. EXTT 77 (each capsule contains 255 mg extract from 2,500–4,000 mg dried ginger and 500–1,500 mg dried galanga (Alpinia galanga) rhizomes) or placebo</td>
<td>Ginger extract produced greater reduction in the primary efficacy variable, knee pain on standing, compared with placebo (63% vs. 50%; p=0.048). Ginger extract also produced a greater response in the secondary efficacy variables compared with placebo, when analyzing mean values: reduction in knee pain after walking 50 ft (15.1 mm vs. 8.7 mm on a visual analog scale; p=0.016), reduction in the Western Ontario and McMaster Universities OA composite index (12.9 mm vs. 9.0 mm on a visual analog scale; p=0.087). The researchers concluded that this highly purified and standardized ginger extract statistically significantly reduced symptoms of OA of the knee. The ginger extract had a moderate effect and a good safety profile with usually mild gastrointestinal adverse events in 59 patients (45%) in the ginger group compared to 21 (16%) in placebo group. An accompanying editorial noted possible lack of effective blinding (ginger patients were told of ginger’s pungent taste), although the trial was otherwise well designed; nevertheless, the editorial notes ginger’s beneficial effects were “small and inconsistent.”</td>
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<tr>
<td>Bliddal et al., 2000</td>
<td>Osteoarthritis</td>
<td>R, PC, DB, CO, Cm n=56 (mean age 66 years)</td>
<td>10 weeks</td>
<td>170 mg ginger extract 2x/day or 400 mg ibuprofen 2x/day</td>
<td>EV. EXTT 33 (ginger extract) vs. ibuprofen vs. placebo</td>
<td>Statistically significant effect demonstrated by explorative statistical methods in the first period of treatment before cross-over, but not following crossover periods. Caution should be observed in the interpretation of a cross-over study of ginger extract. The study concluded that 400 mg/day ibuprofen found to be more efficacious on pain level and function than 170 mg ginger (p&lt;0.0001). The 3-week period of therapy and the single dosage level of ginger used may have been insufficient to discover all of ginger’s effects.</td>
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<td>Meyer et al., 1995</td>
<td>Extra-corporeal chemotherapy (photopheresis) nausea associated with oral psoralen (8-MOP) therapy</td>
<td>O, Cm n=11</td>
<td>Not reported</td>
<td>Single dose of three, 530 mg capsules, 30 minutes prior to 8-MOP ingestion</td>
<td>Powdered ginger capsules (brand not stated)</td>
<td>Significantly reduced nausea induced by psoralen (8-MOP) therapy when taken 30 minutes prior to 8-MOP ingestion. Did not affect 8-MOP absorption or therapeutic effectiveness.</td>
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**KEY:**
- C = controlled, CC = case-control, CH = cohort, CI = confidence interval, Cm = comparison, CO = crossover, CS = cross-sectional, DB = double-blind, E = epidemiological, LC = longitudinal cohort, MA = meta-analysis, MC = multi-center, n = number of patients, O = open, OB = observational, OL = open label, OR = odds ratio, P = prospective, PB = patient-blind, PC = placebo-controlled, PG = parallel group, PS = pilot study, R = randomized, RC = reference-controlled, RCS = retrospective cross-sectional, RS = retrospective, S = surveillance, SB = single-blind, SC = single-center, U = uncontrolled, UP = unpublished, VC = vehicle-controlled.