Clinical Studies on Ginger (*Zingiber officinale* Roscoe)

Kinetosis (Motion Sickness)

Author/Year	Subject	Design	Duration	Dosage	Preparation	Results/Conclusion
Careddu *et al*., 1999	Children with history of motion sickness	R, DB, Cm n=28 (ages 4–8 years)	2 days	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 (12.5–25mg) dimenhydrinate 1/2 hour before the trip and if necessary 1 capsule every 4 hours	Zintona® vs. dimenhydrinate	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 ($p< 0.0001$). 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 ($p< 0.0001$).
Riebenfeld and Borzone, 1999	Sea sickness in passengers on a cruise ship	R, DB, Cm n=60 (ages 10–77 years; mean age 31 years)	7 months	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	Zintona® vs dimenhydrinate	Significantly improved total motion sickness score ($p<0.005$). Ginger is as effective as dimenhydrinate for treatment of motion sickness, with greater tolerability and lower incidence (13.3% vs. 40%) of side effects ($p<0.001$).
Schmid *et al*., 1994	Sea sickness in tourists on a whale-watching safari	R, DB, Cm n=1,489 (ages 16–65 years)	3 months	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	Zintona®	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.

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Kinetosis (Motion Sickness) (cont.)

Author/Year	Subject	Design	Duration	Dosage	Preparation	Results/Conclusion
Stewart *et al.*, 1991	Motion sickness and gastric function	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	14 hours	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 or placbo Phase 4: Two, 250 mg capsules ginger or placebo	Phase 1: ground ginger root Phase 2: fresh ginger (capsules prepared by researchers) Phase 3: ground ginger Phase 4: 250 mg of ginger capsules	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.
Grøntved *et al.*, 1988	Seasickness in naval cadets unaccustomed to sailing	R, DB, PC n=80 (median age 17 years)	4 hours	1 g	Powdered ginger capsules (brand not stated) vs. placebo	Ginger significantly reduced tendency to vomit and experience cold sweats ($p<0.05$). No side effects reported in both groups.
Grøntved and Hentzer, 1986	Vertigo and nystagmus (healthy volunteers who received caloric stimulation of the vestibular system)	R, DB, CO, PC n=48	6 days	1 g/day	Powdered ginger capsules (brand not stated)	Ginger significantly reduced the induced vertigo better than placebo ($p<0.05$). No statistically significant action upon the duration or maximum slow phase velocity of nystagmus.
Mowrey and Clayson, 1982	Motion sickness produced by a motor driven, tilted, revolving chair	R, Cm, PC, SB n=36 volunteer subjects with self-rated extreme or very high susceptibility to motion sickness (ages 18–20 years)	31 minutes	Single dose of 2 capsules (940 mg total)	Powdered ginger capsules (brand not stated)	Ginger is superior to both placebo and dimenhydrinate ($p<0.05$) in preventing the gastrointestinal symptoms of experimentally-induced motion sickness in highly susceptible individuals.

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Nausea During Pregnancy

Author/Year	Subject	Design	Duration	Dosage	Preparation	Results/Conclusion
Vutyavanich *et al*., 2001	Hypermesis 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=0.15), with increasing dose of ginger.
Phillips *et al*., 1993	Day case gynecological laparoscopy	R, P, 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 similarily 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.

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Cardiovascular

Author/Year	Subject	Design	Duration	Dosage	Preparation	Results/Conclusion
Bordia *et al.*, 1997	Platelet aggregation in patients with coronary artery disease with history of myocardial infarcation (76 months)	PC n=60	3 months	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	Powdered ginger capsules (prepared by researchers) vs. fenugreek vs. placebo	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 ($p<0.05$).
Janssen *et al.*, 1996	Platelet thromboxane production	R, PC, multiple CO n=18 healthy volunteers (mean age 22 years)	3 x 2 weeks	15 g daily raw ginger root vs. 40 g daily stem ginger	Vanilla custard with either 15 g raw ginger root or 40 g stem ginger	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 ($p=0.616$).
Lumb, 1994	Platelet function	R, DB, PC, CO n=8 healthy male volunteers	24 hours	Single dose of 4 capsules (2 g total) dried ginger powder	Dried ginger power (capsules prepared by researchers)	No significant differences in bleeding time, platelet count, or platelet aggregation. 2 g dried ginger unlikely to cause platelet dysfunction when used therapeutically.
Verma *et al.*, 1993	Platelet aggregation induced by fatty diet (fed 100 g butter x 7 days)	R, PC n=20 healthy males (ages 30–50 years)	1 week	Four, 625 mg capsules 2x/day with meals	Powdered ginger capsules, 625 mg (prepared by researchers)	Ginger significantly decreased platelet aggregation ($p<0.001$) when taken with fatty meals. Serum cholesterol and triglyceride levels remained unchanged from ginger.
Srivastava, 1989	Thromboxane synthesis	CC, Cm n=12	1 week	5 g/day	Raw fresh ginger	Ginger inhibited eicosanoid biosynthesis. Ginger consumption produced 37% inhibition ($p<0.1$) on TxB2 production in serum.

Other

Author/Year	Subject	Design	Duration	Dosage	Preparation	Results/Conclusion
Altman and Marcussen, 2001	Osteoarthritis (OA) of the knee	R, DB, PC, MC, PG n=247 men and women with OA of the knee (ages ≥ 18 years)	6 weeks preceeded by 1 week washout period	One, 255 mg capsule 2x/day or placebo	EV. EXT 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	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 g.i. 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."
Bliddal *et al.*, 2000	Osteoarthritis	R, PC, DB, CO, Cm n=56 (mean age 66 years)	10 weeks	170 mg ginger extract 2x/day or 400 mg ibuprofen 2x/day	EV. EXT 33 (ginger extract) vs. ibuprofen vs. placebo	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 ($p<0.0001$). 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.

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Other (cont.)

Author/Year	Subject	Design	Duration	Dosage	Preparation	Results/Conclusion
Meyer *et al*., 1995	Extra-corporeal chemotherapy (photo-pheresis) nausea associated with oral psoralen (8-MOP) therapy	O, Cm n=11	Not reported	Single dose of three, 530 mg capsules, 30 minutes prior to 8-MOP ingestion	Powdered ginger capsules (brand not stated)	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.

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