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List of references supporting the assessment of *Zingiber officinale* Roscoe, rhizoma

Final – Revision 1

The European Medicines Agency acknowledges that copies of the underlying works used to produce this monograph were provided for research only with exclusion of any commercial purpose.

Abdel-Aziz H, Nahrstedt A, Petereit F, Windeck T, Ploch M, Verspohl EJ. 5-HT₃ receptor blocking activity of arylalkanes isolated from the rhizome of *Zingiber officinale*. *Planta Med* 2005, 71: 609-616

Abdel-Aziz H, Windeck T, Ploch M, Verspohl EJ. Mode of action of gingerols and shagaols on 5-HT₃ receptors: binding studies, cation uptake by the receptor channel and contraction of isolated guinea-pig ileum. *Eur J Pharmacol* 2006, 530: 136-143

Abudayyak M, Özdemir Nath E, Özhan G. Toxic potentials of ten herbs commonly used for aphrodisiac effect in Turkey. *Turk J Med Sci* 2015, 45: 496-506

Adanlawo IG, Dairo FAS. Nutrient and anti-nutrient constituents of ginger (*Zingiber officinale*, Roscoe) and the influence of its ethanolic extract on some serum enzymes in albino rats. *Int J Biol Chem* 2007, 1: 38-46

Afzal M, Al-Hadidi D, Menon M, Pasek J, Dhami MSI. Ginger: An ethnomedical, chemical and pharmacological review. *Drug Metabol Drug Interact* 2001, 18: 159-190

Ahad A, Raish M, Bin Jordan YA, Alam MA, Al-Mohizea AM, Al-Jenoobi FI. Effect of *Hibiscus sabdariffa* and *Zingiber officinale* on the antihypertensive activity and pharmacokinetic of losartan in hypertensive rats. *Xenobiotica* 2020, 50: 847-857

Ahmad I, Zahin M, Aqil F, Hasan S, Khan MSA, Owais M. Bioactive compounds from *Punica granatum*, *Curcuma longa* and *Zingiber officinale*. *Drugs Future* 2008, 33: 329-346

Ahui MLB, Champy P, Ramadan A, Van LP, Araujo L, Andre KB, *et al.* Ginger prevents TH₂-mediated immune responses in a mouse model of airway inflammation. *Intern Immunopharmacol* 2008, 8: 1626-1632

Aimbire F, Penna SC, Rodrigues M, Rodrigues KC, Lopes-Martins RAB, Sertie JAA. Effect of hydroalcoholic extract of *Zingiber officinalis* rhizomes on LPS-induced rat airway hyperreactivity and lung inflammation. *Prostaglandin Leukot Essent Fatty Acids* 2007, 77: 129-138

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- Akhani SP, Vishwakarma SL, Goyal RK. Anti-diabetic activity of *Zingiber officinale* in streptozotocin-induced type I diabetic rats. *J Pharm Pharmacol* 2004, 56: 101-105
- Akinyemi AJ, Oboh G, Ademiluyi AO, Boligon AA, Athayde ML. Effect of Two Ginger Varieties on Arginase Activity in Hypercholesterolemic Rats. *J Acupunct Meridian Stud* 2016, 9: 80-87
- AlAskar A, Shaheen N, Khan A, AlGhasham N, Mendoza MA, Matar D, *et al.* Effect of daily ginger consumption on platelet aggregation. *J Herb Med* 2020 20: 1-6
- Ali BH, Blunden G, Tanira MO, Nemmar A. Some phytochemical, pharmacological and toxicological properties of ginger (*Zingiber officinale* Roscoe): a review of recent research. *Food Chem Toxicol* 2008, 46: 409-420
- Alnaqeeb MA, Thomson M, Al-Qattan KK, Kamel F, Mustafa T, Ali M. Biochemical and histopathological toxicity of an aqueous extract of ginger. *Kuwait J Sci Eng* 2003, 30: 35-48
- Al-Mohizea AM, Ahad A, Raish M, Al-Jenoobi FI, Alam MA. Improved oral bioavailability of theophylline, a narrow therapeutic index drug by ginger. *Lat Am J Pharm* 2015, 34: 333-337
- Alizadeh-Navaei R, Roozbeh F, Saravi M, Pouramir M, Jalali F, Moghadamnia AA. Investigation of the effect of ginger on lipid levels. A double blind controlled clinical trial. *Saudi M J* 2007, 29: 1280-1284
- Angelini A, Conti P, Ciofani G, Cuccurullo F, Di Ilio C. Modulation of multidrug resistance P-glycoprotein activity by antiemetic compounds in human doxorubicin-resistant sarcoma cells (MES-SA/Dx-5): implications on cancer therapy. *J Biol Regul Homeost Agents*. 2013, 27: 1029-1037
- Apariman S, Ratchanon S, Wiriyaasirivej B. Effectiveness of ginger for prevention of nausea and vomiting after gynecological laparoscopy. *J Med Assoc Thai* 2006, 89: 2003-2009
- Arablou T, Aryaeian N, Valizadeh M, Sharifi F, Hosseini A, Djalali M. The effect of ginger consumption on glycemic status, lipid profile and some inflammatory markers in patients with type 2 diabetes mellitus. *Int J Food Sci Nutr* 2014, 65: 515-520
- Arfeen Z, Owen H, Plummer JL, Ilsley AH, Sorby-Adams RAC, Doecke CJ. A double-blind randomized controlled trial of ginger for the prevention of postoperative nausea and vomiting. *Anaesth Intens Care* 1995; 23: 449-452
- Awang DVC. Ginger. *Can Pharm J* 1992, 225: 309-311
- Ayurvedic Pharmacopoeia of India 2009, 1st edition, vol 1:103-104
- Banihani SA. Review - Ginger and testosterone. *Biomolecules* 2018, 8: 1-8
- Banihani SA. Invited review – Effect of ginger (*Zingiber officinale*) on semen quality. *Andrologia* 2019, 51: 1-7
- Barbalata T, Deleanu M, Carnuta MG, Niculescu LS, Raileanu M, Sima AV, *et al.* Hyperlipidemia Determines Dysfunctional HDL Production and Impedes Cholesterol Efflux in the Small Intestine: Alleviation by Ginger Extract. *Mol Nutr Food Res* 2019, 63: e1900029
- Basirat Z, Moghadamnia AA, Kashifard M, Sarifi-Razavi A. The Effect of Ginger Biscuit on Nausea and Vomiting in Early Pregnancy. *Acta Med Iran* 2009, 47: 51-56
- Benny M, Shylaja MR, Antony B, Kumar Gupta N, Mary R, Anto A, *et al.* Acute and subacute toxicity studies with ginger extracts in rat. *Int J Pharm Sci Res* 2021, 12: 2799-2809

- Bhandari U, Sharma JN, Zafar R. The protective action of ethanolic ginger (*Zingiber officinale*) extract in cholesterol fed rabbits. *J Ethnopharmacol* 1998, 61: 167-171
- Bhandari U, Kanojia R, Pillai KK. Effect of ethanolic extract of *Zingiber officinale* on dyslipidaemia in diabetic rats. *J Ethnopharmacol* 2005, 97: 227-230
- Bhattarai S, Tran VH, Duke CC. Stability of [6]-gingerol and [6]-shagaol in simulated gastric and intestinal fluids. *J Pharm Biomed Anal* 2007, 45: 648-653
- Bidinotto LT, Spinardi-Barbisan AL, Rocha NS, Salvadori DM, Barbisan LF. Effects of ginger (*Zingiber officinale* Roscoe) on DNA damage and development of urothelial tumors in a mouse bladder carcinogenesis model. *Environ Mol Mutagen* 2006, 47: 624-630
- Biruksew A, Zeynudin A, Alemu Y, Golassa L, Yohannes M, Debella A, et al. Zingiber Officinale Roscoe and Echinops Kebericho Mesfin Showed Antiplasmodial Activities against Plasmodium Berghei in a Dose-dependent Manner in Ethiopia. *Ethiop J Health Sci* 2018, 28: 655-664
- Biswas SC, Dey R, Kamliya GS, Bal R, Hazra A, Tripathi SK. A single-masked, randomized, controlled trial of ginger extract in the treatment of nausea and vomiting of pregnancy. *JIMSA* 2011, 24: 167-169
- Bliddal H, Rosetzky A, Schlichting P, Weidner MS, Andersen LA, Ibfehl HH, et al. A randomized, placebo-controlled, cross-over study of ginger extracts and ibuprofen in osteoarthritis. *Osteoarthritis Cartilage* 2000, 8: 9-12
- Blumenthal M, editor. The Complete German Commission E Monographs. American Botanical Council, Austin, Texas 1998: 135-136
- Bode AM, Ma WY, Surh YJ, Dong Z. Inhibition of epidermal growth factor-induced cell transformation and activator protein 1 activation by [6]-gingerol. *Cancer Res* 2001, 61: 850-853
- Bone K. Ginger. *Br J Phytother* 1997, 4: 110-120
- Bone K, Mills S. Principles and Practice of Phytotherapy 2nd ed. Edinburgh, Churchill Livingstone 2013: 578-595
- Bordia A, Verma SK, Srivastava KC. Effect of ginger (*Zingiber officinale* Rosc.) and fenugreek (*Trigonella foenumgraecum* L.) on blood lipids, blood sugar and platelet aggregation in patients with coronary artery disease. *Prostaglandin Leukot Essent Fatty Acids* 1997, 56: 379-384
- Borelli F, Capasso R, Pinto A, Izzo AA. Inhibitory effect of ginger (*Zingiber officinale*) on rat ileal motility. *Life Sci* 2004, 74: 2889-2896
- Borelli F, Capasso R, Aviello G, Pittler MH, Izzo AA. Effectiveness and safety of ginger in the treatment of pregnancy-induced nausea and vomiting. *Obstet Gynecol* 2005, 105: 849-856
- Bradley P. Ginger - Zingiberis rhizome. In British herbal compendium – A handbook of scientific information on widely used plant drugs. Volume 1. Bournemouth: British Herbal Medicine Association 1992, 112-114
- Cakir U, Tayman C, Serkant U, Yakut HI, Cakir E, Ates U, et al. Ginger (*Zingiber officinale* Roscoe) for the treatment and prevention of necrotizing enterocolitis. *J Ethnopharmacol* 2018, 225: 297-308
- Careddu P. Motion sickness in children: results of a double-blind study with ginger (Zintona) and dimenhydrinate. *Healthnotes Rev Complementary Integrative Med* 1999, 6: 102-107

- Chen CC, Ho CT. Gas chromatographic analysis of volatile components of ginger oil (*Zingiber officinale* Roscoe) extracted with liquid carbon dioxide. *J Agric Food Chem* 1988, 36: 322-328
- Chen D, Wu CF, Huang L, Ning Z. Effects of the aqueous extract of xiao-ban-xia-tang on gastric emptying in mice. *Am J Chin Med* 2002, 30: 207-214
- Chiang HM, Chao PD, Hsiu SL, Wen KC, Tsai SY, Hou YC. Ginger Significantly Decreased the Oral Bioavailability of Cyclosporine in Rats. *Am J Chin Med* 2006, 34: 845-855
- Chittumma P, Kaewkiattikum K, Wiriya Siriwach B. Comparison of the effectiveness of ginger and vitamin B₆ for the treatment of nausea and vomiting in early pregnancy: a randomized double-blind controlled trial. *J Med Assoc Thai* 2007, 90: 15-20
- Choi JS, Han JY, Ahn HK, Lee SW, Koong MK, Velazquez-Armenta EY, et al. Assessment of fetal and neonatal outcomes in the offspring of women who had been treated with dried ginger (*zingiberis rhizoma siccus*) for a variety of illnesses during pregnancy. *J Obstet Gynaecol* 2015, 35: 125-130
- Chrubasik S, Pittler MH, Roufogalis BD. Zingeribis rhizome: A comprehensive review on the ginger effect and efficacy profiles. *Phytomedicine* 2005, 12: 684-701
- Çıfci A, Tayman C, Yakut Hİ, Halil H, Çakır E, Çakır U, et al. Ginger (*Zingiber officinale*) prevents severe damage to the lungs due to hyperoxia and inflammation. *Turk J Med Sci* 2018, 48: 892-900
- Connell DW. The chemistry of the essential oil and oleoresin of ginger (*Zingiber officinale* Roscoe). *The Flavour Industry* 1970, 1: 677-693
- Cuzzolin L, Francini-Pesenti F, Verlato G, Joppi M, Baldelli P, Benoni G. Use of herbal products among 392 Italian pregnant women: focus on pregnancy outcome. *Pharmacoepidemiol Drug Saf* 2010, 19: 1151-1158
- Dedov VN, Tran VH, Duke CC, Connor M, MacDonald JC, Mandadi S, et al. Gingerols: a novel class of vanilloid receptor (VR1) agonists. *Br J Pharmacol* 2002, 137: 793-798
- Dev S. Prime Ayurvedic Plant Drugs. Tunbridge Wells UK. Anshan Limited 2006, 451
- Dilokthornsakul W, Rinta A, Dhippayom T, Dilokthornsakul P. Efficacy and Safety of Ginger regarding Human Milk Volume and Related Clinical Outcomes: A Systematic Review of Randomized Controlled Trials. *Complement Med Res* 2022, 29: 67-73
- Dissabandara DLO, Chandrasekara MS. Effects of prenatal ginger rhizome extract treatment on pregnancy outcome and postnatal development of Sprague Dawley rats. *Ceylon J Med Sci* 2007, 50: 1-7
- Dorso CR, Levin RI, Eldor A, Jaffe EA, Weksler BB. Chinese food and platelets. *N Engl J Med* 1980, 303: 756-757
- Dugasani S, Pichika MR, Nadarajah VD, Balijepalli MK, Tandra S, Korlakunta JN. Comparative antioxidant and anti-inflammatory effects of [6]-gingerol, [8]-gingerol, [10]-gingerol and [6]-gingerol. *J Ethnopharmacol* 2010, 127: 515-520
- Egashira K, Sasaki H, Higuchi S, Ieiri I. Food-drug interaction of tacrolimus with pomelo, ginger, and turmeric juice in rats. *Drug Metab Pharmacokinet* 2012, 27: 242-247
- ElMazoudy RH, Attia AA. Ginger causes subfertility and abortifacient in mice by targeting both estrous cycle and blastocyst implantation without teratogenesis. *Phytomedicine* 2018, 50: 300-308

- Elseweidy MM, Younis NN, Elswefy SE, Abdallah FR, El-Dahmy SI, Elnagar G, *et al.* Atheroprotective potentials of curcuminoids against ginger extract in hypercholesterolaemic rabbits. *Nat Prod Res* 2015, 29: 961-965
- El-Abhar HS, Hammad LNA, Gawad HAS. Modulating effect of ginger on rats with ulcerative colitis. *J Ethnopharmacol* 2008, 118: 367-372
- El-Sharakly AS, Newairy AA, Kamel MA, Eweda SM. Protective effect of ginger extract against bromobenzene-induced hepatotoxicity in male rats. *Food Chem Toxicol* 2009, 47: 1584-1590
- Ensiyeh J, Sakineh MS. Comparing ginger and vitamin B6 for the treatment of nausea and vomiting in pregnancy: a randomised controlled trial. *Midwifery* 2009, 25:649-653
- Erlar J, Vostrowsky O, Strobel H, Knobloch. Über ätherische Öle des Ingwer, *Zingiber officinale* Roscoe. *Z Lebensm Unters Forsh* 1988, 186: 231-234 [German]
- ESCOP Monographs, The scientific foundation for herbal medicinal products, 2nd ed. Suppl. 2009, Stuttgart Thieme 2009, 289-303
- Eshaghian R, Mazaheri M, Ghanadian M, Rouholamin S, Feizi A, Babaeian M. The effect of frankincense (*Boswellia serrata*, oleoresin) and ginger (*Zingiber officinale*, rhizoma) on heavy menstrual bleeding: A randomized, placebo-controlled, clinical trial. *Complement Ther Med* 2019, 42: 42-47
- European Pharmacopoeia 7th ed. Ginger - *Zingiberis rhizoma*. Council of Europe 01/2011:1522 corrected 10.0
- Ezzat SM, Ezzat MI, Okba MM, Menze ET, Abdel-Naim AB. The hidden mechanism beyond ginger (*Zingiber officinale* Rosc.) potent in vivo and in vitro anti-inflammatory activity. *J Ethnopharmacol*, 2018, 214: 113-123
- Farthing JE, O'Neill MJ. Isolation of gingerols from powdered root ginger by countercurrent chromatography. *J Liq Chromat* 1990, 13: 941-950
- Firouzbakht M, Nikpour M, Jamali B, Omidvar S. Comparison of ginger with vitamin B6 in relieving nausea and vomiting during pregnancy. *Ayu* 2014, 35: 289-293
- Fischer-Rasmussen W, Kjær SK, Dahl K, Asping U. Ginger treatment of hyperemesis gravidarum. *Eur J Obstet Gynecol Repr Biol* 1990, 38: 19-24
- Flynn DL, Rafferty MF, Boctor AM. Inhibition of human neutrophil 5-lipoxygenase activity by gingerdione, shogaol, capsaicin and related pungent compounds. *Prostaglandins Leukot Med* 1986, 24: 195-198
- Foster BC, Vandenhoeck S, Hana J, Krantis A, Akhtar MH, Bryan M, *et al.* In vitro inhibition of human cytochrome P450-mediated metabolism of marker substrates by natural products. *Phytomedicine* 2003, 10: 334-342
- Fouda A-MM, Berika MY. Evaluation of the effect of hydroalcoholic extract of *Zingiber officinale* rhizomes in rat collagen-induced arthritis. *Basic Clin Pharmacol Toxicol* 2009, 104: 262-271
- Fronzoza CG, Sohrabi A, Polotsky A, Phan PV, Hungerford DS, Lindmark L. An in vitro assay for inhibitors of proinflammatory mediators in herbal extracts using human synoviocyte cultures. *In Vitro Cell Dev Biol – Animal* 2004, 40: 95-101

Fuhrman B, Rosenblat M, Hayek T, Coleman R, Aviram M. Ginger extract consumption reduces plasma cholesterol, inhibits LDL-oxidation and attenuates development of atherosclerosis in atherosclerotic, apolipoprotein E-deficient mice. *J Nutr* 2000, 130: 1124-1131

Ghayur MN, Gilani AH. Pharmacological basis for the medicinal use of ginger in gastrointestinal disorders. *Dig Dis Sci* 2005a, 50: 1889-1897

Ghayur MN, Gilani AH. Ginger lowers blood pressure through blockade of voltage-dependent calcium channels. *J Cardiovasc Pharmacol* 2005b, 45: 74-80

Ghayur MN, Gilani AH, Afridi MB, Houghton PJ. Cardiovascular effects of ginger aqueous extract and its phenolic constituents are mediated through multiple pathways. *Vasc Pharmacol* 2005, 43: 234-241

Gonlacharvit S, Chen YH, Hasler WL, Sun WM, Owyang C. Ginger reduces hyperglycemia-evoked dysrhythmias in healthy humans: possible role of endogenous prostaglandins. *J Pharmacol Exper Ther* 2003, 307: 1098-1103

Gorman GS, Coward L, Darby A, Rasberry B. Effects of herbal supplements on the bioactivation of chemotherapeutic agents. *J Pharm Pharmacol* 2013, 65: 1014-1025

Gressenberger P, Rief P, Jud P, Gütl K, Muster V, Ghanim L, *et al.* Increased bleeding risk in a patient with oral anticoagulant therapy and concomitant herbal intake – a case report. *EJIFCC* 2019, 30: 95-98

Grzanna R, Lindmark L, Frondoza CG. Ginger – An herbal medicinal product with broad anti-inflammatory actions. *J Med Food* 2005; 8:125-132

Grøntved A, Hentzer E. Vertigo-reducing effect of ginger root. A controlled clinical study. *ORL* 1986, 48: 282-286

Grøntved A, Brask T, Kambskard J, Hentzer E. Ginger root against seasickness. A controlled trial on the open sea. *Acta Otolaryngol* 1988, 105: 45-49

Guh J-H, Ko F-N, Jomg T-T, Teng C-M. Antiplatelet effect of gingerol isolated from *Zingiber officinale*. *J Pharm Pharmacol* 1995, 47: 329-332

Gul EE, Erdogan HI, Erer M, Kayrak M. Herbal syncope: ginger-provoked bradycardia. *Am J Emerg Med* 2012, 30: 386.e5-7

Gundala SR, Mukkavilli R, Yang C, Yadav P, Tandon V, Vangala S, *et al.* Enterohepatic recirculation of bioactive ginger phytochemicals is associated with enhanced tumor growth-inhibitory activity of ginger extract. *Carcinogenesis* 2014, 35: 1320-1329

Gupta YK, Sharma M. Reversal of pyrogallol-induced delay in gastric emptying in rats by ginger (*Zingiber officinale*). *Methods Find Exp Clin Pharmacol* 2001, 23: 501-503

Habeeb AA, El-Darawany A-HA, Nasr A-MS, Sharaf AK. Impact of some medicinal plants supplement on pregnant rabbits' diet during hot summer season. *Res J Med Plants* 2019, 13: 145-154

Haksar A, Sharma A, Chawla R, Kumar R, Arora R, Singh S, *et al.* *Zingiber officinale* exhibits behavioral radioprotection against radiation-induced CTA in a gender-specific manner. *Pharmacol Biochem Behav* 2006, 84: 179-188

Hashimoto K, Satoh K, Murata P, Makino B, Salakibara I, Kase Y, *et al.* Component of *Zingiber officinale* that improves the enhancement of small intestinal transport. *Planta Med* 2002, 68: 936-939

Heimes K, Feistel B, Verspohl EJ. Impact of the 5-HT₃ receptor channel system for insulin secretion and interaction of ginger extracts. *Eur J Pharmacol* 2009, 624: 58-65

Heitmann K, Nordeng H, Holst L. Safety of ginger use in pregnancy: results from a large population-based cohort study. *Eur J Clin Pharmacol* 2013, 69: 269-277

Hsiang CY, Lo HY, Huang HC, Li CC, Wu SL, Ho TY. Ginger extract and zingerone ameliorated trinitrobenzene sulphonic acid-induced colitis in mice via modulation of nuclear factor- κ B activity and interleukin-1 β signalling pathway. *Food Chem* 2013, 136: 170-177

Hsiang CY, Cheng HM, Lo HY, Li CC, Chou PC, Lee YC, *et al.* Ginger and Zingerone Ameliorate Lipopolysaccharide-Induced Acute Systemic Inflammation in Mice, Assessed by Nuclear Factor- κ B Bioluminescent Imaging. *J Agric Food Chem* 2015, 63: 6051-6058

Holtmann S, Clarke AH, Scherer H, Höhn M. The anti-motion sickness mechanism of ginger. *Acta Otolaryngol* 1989, 108: 168-174

Hu ML, Rayner CK, Wu KL, Chuah SK, Tai WC, Chou YP, *et al.* Effect of ginger on gastric motility and symptoms of functional dyspepsia. *J Gastroenterol* 2011, 171: 105-110

Imanishi N, Mantani N, Sakai S, Sato M, Katada Y, Ueda K, *et al.* Inducible activity of ginger rhizome (*Zingiber officinale* Rosc.) on the mRNA expression of macrophage-inducible nitric acid (NO) synthase and NO production in a macrophage cell line, RAW264.7 cells. *Am J Chin Med* 2004, 32: 727-735

Indian Herbal Pharmacopoeia, Revised new edition, Mumbai: Indian drug manufacturer's association 2002: 479-490

Indian Pharmacopoeia vol 3. The Indian Pharmacopoeia Commission, Ghaziabad 2007, 2067-2068

Isa Y, Miyakawa Y, Yanagisawa M, Goto T, Kang M-S, Kawada T, *et al.* 6-shagaol and 6-gingerol, the pungent of ginger, inhibit TNF- α mediated downregulation of adiponectin expression via different mechanisms in 3T3-L1 adipocytes. *Biochem Biophys Res Com* 2008, 373: 429-434

Jagetia G, Baliga M, Venkatesh P. Ginger (*Zingiber officinale* Rosc.), a dietary supplement, protects mice against radiation-induced lethality: mechanism of action. *Cancer Biother Radiopharm* 2004, 19: 422-435

Janssen PL, Meyboom S, van Staveren WA, de Vegt F, Katan MB. Consumption of ginger (*Zingiber officinale* Roscoe) does not affect *ex vivo* platelet thromboxane production in humans. *Eur J Clin Nutr* 1996, 50: 772-774

Jiang X, Williams KM, Liauw WS, Ammit AJ, Roufogalis BD, Duke CC, *et al.* Effect of ginkgo and ginger on the pharmacokinetics and pharmacodynamics of warfarin in healthy subjects. *Br J Clin Pharmacol* 2005, 59: 425-532

Jiang S, Wang N, Mi S. Plasma pharmacokinetics and tissue distribution of [6]-gingerol in rats. *Biopharm Drug Dispos* 2008, 29: 529-537

Jolad SD, Lantz RC, Solyom AM, Chen GJ, Bates RB, Timmermann BN. Fresh organically grown ginger (*Zingiber officinale*): composition and effects on LPS-induced PGE₂ production. *Phytochemistry* 2004, 65: 1937-1954

Jolad SD, Lantz RC, Chen GJ, Bates RB, Timmermann BN. Commercially processed dry ginger (*Zingiber officinale*): Composition and effects on LPS-stimulated PGE₂ production. *Phytochemistry* 2005, 66: 1614-1635

- Jung HW, Toon C-H, Park KM, Han HS, Park YK. Hexane fraction of *Zingiberis Rhizoma Crudus* extract inhibits the production of nitric oxide and proinflammatory cytokines in LPS-stimulated BV2 microglial cells via the NF-kappaB pathway. *Food Chem Toxicol* 2009, 47: 1190-1197
- Kamtchouing P, Fandio GYM, Dimo T, Jatsa HB. Evaluation of androgenic activity of *Zinger officinale* and *Pentadiplandra Brazzeana* in male rats. *Asian J Androl* 2002, 4: 299-301
- Kapoor LD. Handbook of Ayurvedic Medicinal Plants. Boca Raton, Florida, CRC Press 1990: 341-342
- Kar A, Choudhary BK, Bandyopadhyay NG. Comparative evaluation of hypoglycaemic activity of some Indian medicinal plants in alloxan diabetic rats. *J Ethnopharmacol* 2003, 84: 105-108
- Katiyar SK, Agarwal R, Mukhtar H. Inhibition of tumor promotion in SENCAR mouse skin by ethanol extract of *Zingiber officinale* rhizome. *Cancer Res* 1996, 56: 1023-1030
- Khan AM, Shahzad M, Raza Asim MB, Imran M, Shabbir A. Zingiber officinale ameliorates allergic asthma via suppression of Th2-mediated immune response. *Pharm Biol* 2015, 53: 359-367
- Khaki A, Fathiazad F, Nouri M, Khaki AA, Ozanci CC. The effects of ginger on spermatogenesis and sperm parameters of rat. *Iran J Reprod Med* 2009, 7: 7-12
- Kim J-K, Kim Y, Na K-M, Surh Y-J, Kim T-Y. [6]-gingerol prevents UVB-induced ROS production and COX-2 expression *in vitro* and *in vivo*. *Free Rad Res* 2007, 41: 603-614
- Kim IS, Kim SY, Yoo HH. Effects of an aqueous-ethanolic extract of ginger on cytochrome P450 enzyme-mediated drug metabolism. *Pharmazie* 2012, 67: 1007-1009
- Kim JS, Choi J-S. Single-dose oral toxicity and acute dermal irritation of steamed and dried ginger extract in rat and white rabbit. *J Anim Plant Sci* 2017, 27: 1822-1828
- Kim HJ, Kim IS, Rehman SU, Ha SK, Nakamura K, Yoo HH. Effects of 6-paradol, an unsaturated ketone from gingers, on cytochrome P450-mediated drug metabolism. *Bioorg Med Chem Lett.* 2017, 27: 1826-1830
- Kimura Y, Ito H, Hatano T. Effects of mace and nutmeg on human cytochrome P450 3A4 and 2C9 activity. *Biol Pharm Bull.* 2010, 33: 1977-1982
- Koo KKL, Ammit AJ, Tran VH, Duke CC, Roufogalis BD. Gingerols and related analogues inhibit arachidonic acid-induced human platelet serotonin release and aggregation. *Thromb Res* 2001, 103: 387-397
- Kotwal P, Dogra A, Sharma A, Bhatt S, Gour A, Sharma S, *et al.* Effect of Natural Phenolics on Pharmacokinetic Modulation of Bedaquiline in Rat to Assess the Likelihood of Potential Food-Drug Interaction. *J Agric Food Chem* 2020, 68: 1257-1265
- Krüth P, Brosi E, Fux R, Mörike K, Gleiter CH. Ginger-associated over anticoagulation by phenprocoumon. *Ann Pharmacother* 2004, 38: 257-260
- Kusumawardani PA, Cholifah S, Multazam MT, Nandiyanto ABD, Abdullah AG, Widiaty I. Effect of Ginger Drinks on Nausea Vomiting in The First Trimester of Pregnancy. *IOP Conf Ser Mater Sci Eng* 2018, 288: 012161 - doi:10.1088/1757-899X/288/1/012161
- Laekeman GM, Van Calsteren K, Devlieger R, Sarafanova E, Van Limbeek J, Dierckxsens Y. Ginger (*Zingiber officinale*) Root Extract During Pregnancy: A Clinical Feasibility Study. *Planta Med* 2021, 87: 907-912

- Langhammer AJ, Nilsen OG. In vitro inhibition of human CYP1A2, CYP2D6, and CYP3A4 by six herbs commonly used in pregnancy. *Phytother Res.* 2014, 28: 603-610
- Lantz RC, Chen GJ, Sarihan M, Solyom AM, Jolad SD, Timmermann BN. The effect of extracts from ginger rhizome on inflammatory mediator production. *Phytomedicine* 2007, 14: 123-128
- Lawrence BM. Major tropical spices – Ginger (*Zingiber officinale* Rosc.). *Perfumer and Flavorist* 1984, 9: 1-40
- Lee W, Ku SK, Kim MA, Bae JS. Anti-factor Xa activities of zingerone with anti-platelet aggregation activity. *Food Chem Toxicol* 2017, 105: 186-193
- Lesho EP, Saullo L, Udvari-Nagy S. A 76-year-old woman with erratic anticoagulation. *Cleve Clin J Med* 2004, 71: 651-656
- Li M, Chen PZ, Yue QX, Li JQ, Chu RA, Zhang W, et al. Pungent ginger components modulates human cytochrome P450 enzymes in vitro. *Acta Pharmacol Sin* 2013, 34: 1237–1242
- Li LL, Cui Y, Guo XH, Ma K, Tian P, Feng J, et al. Pharmacokinetics and Tissue Distribution of Gingerols and Shogaols from Ginger (*Zingiber officinale* Rosc.) in Rats by UPLC-Q-Exactive-HRMS. *Molecules* 2019, 24: 512
- Liao YR, Leu YL, Chan YY, Kuo PC, Wu TS. Anti-platelet aggregation and vasorelaxing effects of the constituents of the rhizomes of *Zingiber officinale*. *Molecules* 2012, 17: 8928-8937
- Lien HC, Sun WM, Chen YH, Kim H, Hasler W, Owyang C. Effects of ginger on motion sickness and gastric slow-wave dysrhythmias induced by circularvection. *Am J Physiol Gastrointest Liver Physiol* 2003, 284: G481-489
- Lohsirawat S, Rukkiat M, Chaikomin R, Leelakusolvong S. Effect of ginger on lower esophageal sphincter pressure. *J Med Assoc Thai* 2010, 93: 366-372
- Lumb AB. Effect of dried ginger on human platelet function. *Thromb Haemost* 1994, 71: 110-111
- Maaradarani O, Bitar Z, Mohsen M. Adding herbal products to direct-acting oral anticoagulants can be fatal. *EJCRIM* 2019, 6(8):001190. doi: 10.12890/2019_001190
- Maghbooli M, Golipour F, Moghimi Esfandabadi A, Yousefi M. Comparison Between the Efficacy of Ginger and Sumatriptan in the Ablative Treatment of the Common Migraine. *Phytother Res* 2014, 28: 412-415
- Mahluji S, Attari VE, Mobasser M, Payahoo L, Ostadrahimi A, Golzari SE. Effects of ginger (*Zingiber officinale*) on plasma glucose level, HbA1c and insulin sensitivity in type 2 diabetic patients. *Int J Food Sci Nutr* 2013, 64: 682-686
- Martins LB, Rodrigues AMDS, Rodrigues DF, Dos Santos LC, Teixeira AL, Ferreira AVM. Double-blind placebo-controlled randomized clinical trial of ginger (*Zingiber officinale* Rosc.) addition in migraine acute treatment. *Cephalalgia* 2019, 39: 68-76
- Matthews A, Haas DM, O'Mathúna DP, Dowswell T. Interventions for nausea and vomiting in early pregnancy. *Cochrane Database of Systematic Reviews* 2015, Issue 9. Art. No.: CD007575. DOI: 10.1002/14651858.CD007575.pub4
- Mehrdad M, Messripour M, Ghobadipour M. The effect of ginger extract on blood urea nitrogen and creatinine in mice. *Pakistan J Biol Sci* 2007, 10: 2968-2971

- Micklefield GH, Redeker Y, Meister V, Jung O, Greving I, May B. Effects of ginger on gastroduodenal motility. *Intern J Clin Pharmacol Ther* 1999, 37: 341-346
- Mills SY. in Evans WC. Trease and Evans Pharmacognosy 15th edition. Edinburgh, WB Saunders 2002: 482-487
- Mohammed OJ, Liaque Latif M, Pratten MK. Evaluation of embryotoxicity for major components of herbal extracts using the chick embryonic heart micromass and mouse D3 embryonic stem cell systems. *Reproductive Toxicology* 2016, 59: 117-127
- Mowrey DB, Clayson DE. Motion sickness, ginger, and psychophysics. *Lancet* 1982, 1: 655-657
- Mukkavilli R, Gundala SR, Yang C, Donthamsetty S, Cantuaria G, Jadhav GR, *et al.* Modulation of cytochrome P450 metabolism and transport across intestinal epithelial barrier by ginger biophenolics. *PLoS One*. 2014, 9: e108386
- Mukkavilli R, Yang C, Singh Tanwar R, Ghareeb A, Luthra L, *et al.* Absorption, Metabolic Stability, and Pharmacokinetics of Ginger Phytochemicals. *Molecules* 2017, 22: 553
- Mukkavilli R, Yang C, Tanwar RS, Saxena R, Gundala SR, Zhang Y, *et al.* Pharmacokinetic-pharmacodynamic correlations in the development of ginger extract as an anticancer agent. *Sci Rep*. 2018, 8: 3056
- Nabekura T, Kamiyami S, Kitagawa S. Effects of dietary chemopreventive phytochemicals on P-glycoprotein function. *Biochem Biophys Res Comm* 2005, 327: 866-870
- Nagabhushan M, Bhide SV. Mutagenicity of chili extract and capsaicin in short-term trials. *Environ Mutagen* 1985, 7: 881-888
- Nagabhushan M, Amonkar AJ, Bhide SV. Mutagenicity of gingerol and shagaol and antimutagenicity of zingerone in salmonella/microsome assay. *Cancer Lett* 1987, 36: 221-233
- Nakamura H, Yamamoto T. Mutagen and antimutagen in ginger *Zingiber officinale*. *Mutat Res* 1982, 103: 119-126
- Nakamura H, Yamamoto T. The active part of the [6]-gingerol molecule in mutagenesis. *Mutat Res* 1983, 122: 87-94
- Nammi S, Kim MS, Gavande NS, Li GQ, Roufogalis BD. Regulation of low-density lipoprotein receptor and 3-hydroxy-3-methylglutaryl coenzyme A reductase expression by *Zingiber officinale* in the liver of high-fat diet-fed rats. *Basic Clin Pharmacol Toxicol* 2010, 106: 389-395
- Nammi S, Sreemantula S, Roufogalis BD. Protective effect of ethanolic extract of *Zingiber officinale* rhizome on the development of metabolic syndrome in high-fat diet-fed rats. *Basic Clin pharmacol Toxicol* 2009, 104: 366-373
- Nanjundaiah SM, Annaiah HNM, Dharmesh SM. Gastroprotective effect of ginger rhizome (*Zingiber officinale*) extract: Role of gallic acid and cinnamic acid in H⁺,K⁺-ATPase/*H. pylori* inhibition and anti-oxidative mechanism. *Evid Based Complement Alternat Med* 2011, 2011: 249487
- Narita M, Hatano E, Tamaki N, Yamanaka K, Yanagida A, Nagata H, *et al.* Dai-kenchu-to attenuates rat sinusoidal obstruction syndrome by inhibiting the accumulation of neutrophils in the liver. *J Gastroenterol Hepatol* 2009, 24: 1951-1057
- Nduka SO, Okonta MJ, Esimone CO. Effects of *Zingiber officinale* on the plasma pharmacokinetics and lung penetrations of ciprofloxacin and isoniazid. *Am J Ther* 2013, 20: 507-513

- Nie H, Meng LZ, Zhang H, Yin Z, Huang XS. Analysis of anti-platelet aggregation components of *Rhizoma Zingiberis* using chicken thrombocyte extract and high-performance liquid chromatography. *Chin Med J* 2008, 121: 1226-1229
- Nikkhah-Bodaghi M, Maleki I, Agah S, Hekmatdoost A. *Zingiber officinale* and oxidative stress in patients with ulcerative colitis: A randomized, placebo-controlled, clinical trial. *Complement Ther Med* 2019, 43: 1-6
- Nirmala K, Krishna TP, Polasa K. Modulation of xenobiotic metabolism in ginger (*Zingiber officinale* Roscoe) fed rats. *Int J Nutr Metabol* 2010, 2: 56-62
- Nurtjahja-Tjendraputra E, Ammit AJ, Roufogalis BD, Tran VH, Duke CC. Effective anti-platelet and COX-1 enzyme inhibitors from pungent constituents of ginger. *Thromb Res* 2003, 111: 259-265
- O'Donnell A, McParlin C, Robson SC, Beyer F, Moloney E, Bryant A, *et al.* Treatments for hyperemesis gravidarum and nausea and vomiting in pregnancy: a systematic review and economic assessment. *Health Technol Assess* 2016, 20: 1-268
- Ojewole JAO. Analgesic, antiinflammatory and hypoglycaemic effects of ethanol extract of *Zingiber officinale* (Roscoe) rhizomes (*Zingiberaceae*) in mice and rats. *Phytother Res* 2006, 20: 764-772
- Okonta JM, Uboh M, Obonga WO. Herb-drug interaction: a case study of effect of ginger on the pharmacokinetic of metronidazole in rabbit. *Indian J Pharm Sci* 2008, 70: 230-232
- Okuhira H, Nakatani Y, Furukawa F, Kanazawa N. Anaphylaxis to ginger induced by herbal medicine. *Allergol Int* 2020, 69: 159-160
- Ozgoli G, Goli M, Simbar M. Effects of ginger capsules on pregnancy, nausea and vomiting. *J Altern Compl Med* 2009, 15: 243-246
- Pan MH, Hsieh MC, Hsu PC, Ho ST, Lai CS, Wu H, *et al.* 6-shogaol suppressed lipopolysaccharide-induced up-expression of iNOS and COX-2 in murine macrophages. *Mol Nutr Food Res* 2008, 52: 1467-1477
- Park KK, Chun KS, Lee JM, Lee SS, Surh YJ. Inhibitory effects of [6]-gingerol, a major pungent principle of ginger, on phorbol ester-induced inflammation, epidermal ornithine decarboxylase activity and skin tumor promotion in ICR mice. *Cancer Lett* 1998, 129: 139-144
- Penna SC, Medeiros MV, Aimbire FSC, Faria-Neto HCC, Sertie JAAA, Lopes-Martins RAB. Anti-inflammatory effect of the hydroalcoholic extract of *Zingiber officinale* rhizomes on rat paw and skin edema. *Phytomedicine* 2003, 10: 381-385
- Phan PV, Sohrabi A, Polotsky A, Hungerford DS, Lindmark L, Frondoza CG. Ginger extract components suppress induction of chemokine expression in human synoviocytes. *J Altern Compl Med* 2005, 11: 149-154
- Pharmacopoeia of the People's Republic of China vol 1. People's Medical Publishing House 2005: 280-281
- Phillips S, Hutchinson S, Ruggier R. *Zingiber officinale* does not affect gastric emptying rate. *Anaesthesia* 1993, 48: 393-395
- Plengsuriyakarn T, Na-Bangchang K. Preclinical toxicology and anticholangiocarcinoma activity of oral formulation of standardized extract of *Zingiber officinale*. *Planta Med* 2020, 86: 104-112

Plengsuriyakarn T, Viyanant V, Eursittichai V, Tesana A, Chaijaroenkul W, Itharat A, *et al.* Cytotoxicity, toxicity, and anticancer activity of *Zingiber officinale* Roscoe against cholangiocarcinoma. *Asian Pacific J Cancer Prev* 2012, 13: 4597-4606

Pongroj paw D, Somprasit C, Chanthasenanont A. A randomized comparison of ginger and dimenhydrinate in the treatment of nausea and vomiting in pregnancy. *J Med Assoc Thai* 2007, 90: 1703-1709

Portnoi G, Chng L-A, Karimi-Tabesh L, Koren G, Tan MP, Einarson A. Prospective comparative study of the safety and effectiveness of ginger for the treatment of nausea and vomiting in pregnancy. *Am J Obstet Gynecol* 2003, 189: 1374-1377

Ratanavalachai T, Thitiorul S, Tanuchit S, Jenkhetkan W, Itharat A, Sakpakdeejaroen I. Synergistic genotoxic effects and modulation of cell cycle by ginger ethanolic extracts in adjunct to doxorubicin in human lymphocytes in vitro. *J Med Assoc Thai* 2015, 98: 101-109

Revol, B, Gautier-Veyret, E, Arrivé, C, Fouilhé Sam-Lai N, McLeer-Florin A, Pluchart H, *et al.* Pharmacokinetic herb-drug interaction between ginger and crizotinib. *Br J Clin Pharmacol.* 2020; 86: 1892–1893

Rubin D, Patel V, Eric Dietrich E. Effects of Oral Ginger Supplementation on the INR. *Case Rep Med* 2019, Article ID 8784029

Saberi F, Sadat Z, Abedzadeh-Kalahroudi M, Taebi M. Acupressure and ginger to relieve nausea and vomiting in pregnancy: a randomized study. *Iran Red Crescent Med J* 2013, 15: 854-861

Saberi F, Sadat Z, Abedzadeh-Kalahroudi M, Taebi M. Effect of ginger on relieving nausea and vomiting in pregnancy: a randomized, placebo-controlled trial. *Nurs Midwifery Stud* 2014, 3: e11841

Sang S, Hong J, Wu H, Liu J, Yang CS, Pan MH, *et al.* Increased growth inhibitory effects on human cancer cells and anti-inflammatory potency of shogaols from *Zingiber officinale* relative to gingerols. *J Agric Food Chem* 2009, 57: 10645-10650

Schmid R, Schick T, Steffen R, Tschopp, Wilk T. Comparison of seven commonly used agents for prophylaxis of seasickness. *J Travel Med* 1994, 1: 203-206

Schmidt J, Dahl S, Sherson DL. [Allergic rhinoconjunctivitis caused by occupational exposure to ginger]. *Ugeskr Laeger* 2015, 6: 177(28). [Hungarian] Abstract only in English

Shalaby MA, Hamowieh AR. Safety and efficacy of *Zingiber officinale* roots on fertility of male diabetic rats. *Food Chem Toxicol* 2010, 48: 2920-2924

Shalansky S, Lynd L, Richardson K, Ingaszewski, Kerr C. Risk of warfarin-related bleeding events and supratherapeutic international normalized ratios associated with complementary and alternative medicine: a longitudinal analysis. *Pharmacotherapy* 2007, 27: 1237-1247

Sharifzadeh F, Kashanian M, Koohpayehzadeh J, Rezaian F, Sheikhansari N, Eshraghi N. A comparison between the effects of ginger, pyridoxine (vitamin B6) and placebo for the treatment of the first trimester nausea and vomiting of pregnancy (NVP). *J Matern Fetal Neonatal Med* 2018, 31: 2509-2514

Sharma JN, Srivastava KC, Gan EK. Suppressive effects of eugenol and ginger oil in arthritic rats. *Pharmacology* 1994, 49: 314-318

Sharma SS, Gupta YK. Reversal of cisplatin-induced delay in gastric emptying in rats by ginger (*Zingiber officinale*). *J Ethnopharmacol* 1998, 62: 49-55

- Sharma A, Haksar A, Chawla R, Kumar R, Arora R, Singh S, *et al.* *Zingiber officinale* Rosc. modulates gamma radiation-induced conditioned taste aversion. *Pharmacol Biochem Behav* 2005, 81: 864-870
- Shehab NG, Khan RKG, Elgailani ESE, Shawish KYA. Possible intrusive food interaction with oral dabigatran's anticoagulant activity in a rat models. *Trop J Pharm Res* 2018, 17: 2031
- Shibata C, Sasaki I, Naito H, Ueno T, Matsuno S. The herbal medicine Dai-Kenchu-Tou stimulates upper gut motility through cholinergic and 5-hydroxytryptamine 3 receptors in conscious dogs. *Surgery* 1999, 126: 918-924
- Shukla Y, Singh M. Cancer preventive properties of ginger: A brief review. *Food Chem Toxicol* 2007, 45: 683-690
- Shukla Y, Prasad S, Tripathi C, Singh M, George J, Kalra N. *In vitro* and *in vivo* modulation of testosterone mediated alterations in apoptosis related proteins by [6]-gingerol. *Mol Nutr Food Res* 2007, 51: 1492-1502
- Sivaswami SN, Balachandran B, Balanehru S, Sivaramakrishnan VM. Mutagenic activity of South Indian food items. *Indian J Exper Toxicol* 1991, 29: 730-737
- Smith C, Crowther C, Willson K, Hotham N, McMillian V. A randomized controlled trial of ginger to treat nausea and vomiting in pregnancy. *Obstet Gynecol* 2004, 103: 639-645
- Soudamini KK, Unnikrishnan MC, Sukumaran K, Kuttan R. Mutagenicity and anti-mutagenicity of selected spices. *Indian J Physiol Pharmacol* 1995, 39: 347-353
- Srivastava KC. Aqueous extracts of onion, garlic and ginger inhibit platelet aggregation and alter arachidonic acid metabolism. *Biomed Biochem Acta* 1984, 8/9: 335-346
- Srivastava KC. Isolation and effects of some ginger components on platelet aggregation and eicosanoid biosynthesis. *Prostaglandins Leukot Essent Fatty Acids* 1986, 25: 187-198
- Srivastava KC. Effect of onion and ginger consumption on platelet thromboxane production in humans. *Prostaglandins Leukot Essent Fatty Acids* 1989, 35: 183-185
- Stanisiere J, Mousset PY, Lafay S. How Safe Is Ginger Rhizome for Decreasing Nausea and Vomiting in Women during Early Pregnancy? *Foods* 2018, 7, 50: 1-29
- Steinegger E, Stucki K. Trennung und quantitative Bestimmung der Hauptscharfstoffe von Zingiberis rhizome mittels kombinierter DC/HPLC. *Pharm Acta Helv* 1982, 57: 66-71
- Stewart JJ, Wood MJ, Wood CD, Mims ME. Effects of ginger on motion sickness susceptibility and gastric function. *Pharmacol* 1991, 42: 111-120
- Suekawa M, Ishige A, Yuasa K, Sudo K, Aburada M, Hosoya E. Pharmacological studies on ginger. I. Pharmacological actions of pungent constituents, (6)-gingerol and (6)-shagaol. *J Pharm Dyn* 1984, 7: 836-848
- Thomson M, Al-Qattan KK, Al-Sawan SM, Alnaqeeb MA, Khan I, Ali M. The use of ginger (*Zingiber officinale* Rosc.) as a potential anti-inflammatory agent and antithrombotic agent. *Prostaglandins Leukot Essent Fatty Acids* 2002, 67: 475-478
- Thomson M, Corbin R, Leung L. Effects of ginger for nausea and vomiting in early pregnancy: a meta-analysis. *J Am Board Fam Med* 2014, 27: 115-122

- Tjendraputra E, Tran VH, Liu-Brennan D, Roufogalis BD, Duke CC. Effect of ginger constituents and synthetic analogues on cyclooxygenase-2 enzyme in intact cells. *Bioorg Chem* 2001, 29: 156-163
- Tokita Y, Yuzurihara M, Sakaguchi M, Satoh K, Kase Y. The pharmacological effects of *Daikenchuto*, a traditional herbal medicine, on delayed gastrointestinal transit in rat postoperative ileus. *J Pharmacol Sci* 2007, 104: 303-310
- Tripathi S, Maier KG, Bruch D, Kittur DS. Effect of 6-gingerol on pro-inflammatory cytokine production and costimulatory molecule expression in murine peritoneal macrophages. *J Surg Res* 2007, 138: 209-213
- Tripathi S, Bruch D, Kittur DS. Ginger extract inhibits LPS induced macrophage activation and function. *BMC Compl Altern Med* 2008, 8: 1
- Ueki S, Miyoshi M, Shido O, Hasegawa J, Watanabe T. Systemic administration of 6-gingerol, a pungent constituent of ginger, induces hypothermia in rats via an inhibitory effect on metabolic rate. *Eur J Pharmacol* 2008, 584: 87-92
- van Tilburg MA, Palsos OS, Ringel Y, Whitehead WE. Is ginger effective for the treatment of irritable bowel syndrome? A double blind randomized controlled pilot trial. *Complement Ther Med* 2014, 22: 17-20
- van Toorenbergen AW, Dieges PH. Immunoglobulin E antibodies against coriander and other spices. *Clin Immunol* 1985, 76: 477-481
- Verma SK, Singh J, Khamesra R, Bordia A. Effect of ginger on platelet aggregation in man. *Indian J Med Res* 1993, 98: 240-242
- Verma SK, Bordia A. Ginger, fat and fibrinolysis. *Indian J Med Sci* 2001, 55: 83-86
- Viljoen E, Visser J, Koen N, Musekiwa A. A systematic review and meta-analysis of the effect and safety of ginger in the treatment of pregnancy-associated nausea and vomiting. *Nutr J* 2014, 13: 1-14
- Vutyavanich T, Kraissarin T, Ruangsri R-A. Ginger for nausea and vomiting in pregnancy: randomized, double-masked, placebo-controlled study. *Obstet Gynecol* 2001, 97: 577-582
- Weidner MS, Sigwart K. The safety of a ginger extract in the rat. *J Ethnopharmacol* 2000, 73: 513-520
- Weidner MS, Sigwart K. Investigation of the teratogenic potential of a *Zingiber officinale* extract in the rat. *Reprod Toxicol* 2001, 15: 75-80
- WHO monographs on selected medicinal plants vol 1. World Health Organization, Geneva 1999: 277-287
- Wigler I, Grotto I, Caspi D, Yaron M. The effects of Zintona EC (a ginger extract) on symptomatic gonarthrosis. *Osteoarthritis Cartilage* 2003, 11: 783-789
- Wilasrusmee C, Kittur S, Siddiqui J, Bruch D, Wilasrusmee S, Kittur DS. In vitro immunomodulatory effects of ten commonly used herbs on murine lymphocytes. *J Altern Compl Med* 2002a, 8: 467-475
- Wilasrusmee C, Siddiqui J, Bruch D, Wilasrusmee S, Kittur S, Kittur DS. In vitro immunomodulatory effects of herbal products. *Am Surg* 2002b, 68: 860-864
- Wilkinson JM. Effect of ginger tea on the fetal development of Sprague-Dawley rats. *Repr Toxicol* 2000, 14: 507-512

- Willetts KE, Ekangaki A, Eden JA. Effect of ginger extract on pregnancy-induced nausea. *Austr NZ J Obstet Gynaecol* 2003, 43: 139-144
- Wiesner J, Knöss W. Herbal medicinal products in pregnancy - which data are available? *Reprod Toxicol* 2017, 72: 142-152
- Wood CD, Manno JE, Wood MJ, Manno BR, Mims ME. Comparison of efficacy of ginger with various antiemetic drugs. *Clin Res Pract Drug Reg Affairs* 1988, 6: 129-136
- Wu HC, Horng CT, Tsai SC, Lee YL, Hsu SC, Tsai YJ, *et al.* Relaxant and vasoprotective effects of ginger extracts on porcine coronary arteries. *Int J Mol Med* 2018, 41: 2420-2428
- Wu KL, Rayner CK, Chuah SK, Changchien CS, Lu SN, Chiu YC, *et al.* Effects of ginger on gastric emptying and motility in healthy humans. *Eur J Gastroenterol Hepatol* 2008, 20: 436-440
- Yamahara J, Mochizuki M, Rong HQ, Matsuda H, Fujimura H. The anti-ulcer effect in rats of ginger constituents. *J Ethnopharmacol* 1988, 23: 299-304
- Yamahara J, Rong HQ, Naitoh Y, Kitani T, Fujimura H. Inhibition of cytotoxic drug-induced vomiting in *Suncus* by a ginger constituent. *J Ethnopharmacol* 1989a, 27: 353-355
- Yamahara J, Huang QR, Iwamoto M, Kobayashi G, Matsuda H, Fujimura H. Active components of ginger exhibiting anti-serotonergic action. *Phytother Res* 1989b, 3: 70-71
- Yamahara J, Huang Q, Li Y, Xu L, Fujimura H. Gastrointestinal motility enhancing effect of ginger and its active constituents. *Chem Pharm Bull* 1990, 38: 430-431
- Yang G, Zhong L, Jiang L, Geng C, Cao J, Sun X, *et al.* Genotoxic effect of 6-gingerol on human hepatoma G2 cells. *Chem Biol Interact* 2010, 185: 12-17
- Young HY, Luo YL, Cheng HY, Hsieh WC, Liao JC, Peng WH. Analgesic and anti-inflammatory activities of [6]-gingerol. *J Ethnopharmacol* 2005, 96: 207-210
- Young HY, Liao JC, Chang YS, Luo YL, Lu MC, Peng WH. Synergistic effect of ginger and nifedipine on human platelet aggregation: a study in hypertensive patients and normal volunteers. *Am J Chin Med* 2006, 34: 545-551
- Yu Y, Zick S, Li X, Zou P, Wright B, Sun D. Examination of the pharmacokinetics of active ingredients of ginger in humans. *AAPS J* 2011, 13: 417-426
- Yocum GT, Hwang JJ, Mikami M, Danielsson J, Kuforiji AS, Emala CW. Ginger and its bioactive component 6-shogaol mitigate lung inflammation in a murine asthma model. *Am J Physiol Lung Cell Mol Physiol* 2020, 318: L296-L303
- Zhang W, Lim LY. Effects of spice constituents on P-glycoprotein-mediated transport and CYP3A4-mediated metabolism in vitro. *Drug Metab Dispos* 2008, 36: 1283-1290
- Zick SM, Djuric Z, Ruffin MT, Litzinger AJ, Normolle DP, Alrawi S, *et al.* Pharmacokinetics of 6-gingerol, 8-gingerol, 10-gingerol, and 6-shogaol and conjugate metabolites in healthy human subjects. *Cancer Epidemiol Biomarkers Prev* 2008, 17: 1930-1936
- Zick SM, Ruffin MT, Lee J, Normolle DP, Siden R, Alrawi S, *et al.* Phase II trial of encapsulated ginger as a treatment for chemotherapy-induced nausea and vomiting. *Support Care Cancer* 2009, 17: 563-572