

References

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Abudayyak, M., Özdemir Nath, E., & Özhan, G. (2015). Toxic potentials of ten herbs commonly used for aphrodisiac effect in Turkey. **Turkish journal of medical sciences**, 45(3), 496–506. <https://doi.org/10.3906/sag-1401-153>.

AlAskar, A; Shaheen, NA; Khan, AH; AlGhasham, N; Mendoza, MA; Matar, DB; Gmati, G; AlJeraisy, M; AlSuhaibani, A: (2020). [Effect of daily ginger consumption on platelet aggregation. Journal of Herbal Medicine](#). Volume 20, 100316. <https://doi.org/10.1016/j.hermed.2019.100316>.

Alnaqeeb MA, Thomson M, Al-Qattan KK, Kamel F, Mustafa T, Ali M. (2003): [Biochemical and histopathological toxicity of an aqueous extract of ginger](#). Kuwait J Sci Eng, 30: 35-48.

Al Omari, I; Afifi, F; Salhab, A. (2012). [Therapeutic Effect and Possible Herb Drug Interactions of Ginger \(Zingiber officinale Roscoe, Zingiberaceae\) Crude Extract with Glibenclamide and Insulin](#). Pharmacognosy Communications. 2. 12-20.

<http://dx.doi.org/10.5530/pc.2012.1.4>.

Altyn, I., & Twarużek, M. (2020). [Mycotoxin Contamination Concerns of Herbs and Medicinal Plants](https://doi.org/10.3390/toxins12030182). *Toxins*, 12(3), 182. <https://doi.org/10.3390/toxins12030182>

The Committee on Toxicity of Chemicals in Food, Consumer Products and the environment (COT) (2020). [Scoping Paper on Herbal Supplements Used in Pregnancy](#).

Belsito, M. D., Cohen, D. E., Klaassen, C. D., Liebler, D. C., Peterson, L. A., Shank, R. C., Snyder, P. W. (2021). Safety Assessment of Zingiber officinale (Ginger)-Derived Ingredients as Used in Cosmetics. [Ginger.pdf](#).

Bryer, E. (2005). A literature review of the effectiveness of ginger in alleviating mild-to-moderate nausea and vomiting of pregnancy. **Journal of midwifery & women's health**, 50 (1), e1-e3. <https://doi.org/10.1016/j.jmwh.2004.08.023>.

Chittumma, P., Kaewkiattikun, K., & Wiriyasiriwach, B. (2007). Comparison of the effectiveness of ginger and vitamin B6 for treatment of nausea and vomiting in early pregnancy: a randomized double-blind controlled trial. *Journal-medical association of thailand*, 90(1), 15. [PMID: 14649969](https://pubmed.ncbi.nlm.nih.gov/14649969/).

The Committee on Toxicity of Chemicals in Food, Consumer Products and the environment (COT) (2021). [The potential effects that ginger and ginger supplements may have during pregnancy and lactation](#).

Dietz, B. M., Hajirahimkhan, A., Dunlap, T. L., & Bolton, J. L. (2016). [Botanicals and Their Bioactive Phytochemicals for Women's Health](#). **Pharmacological reviews**, 68(4), 1026-1073.

DTU Food Institute, (2019). [The safety of pregnant women when ingesting ginger shots made from the root from real ginger \(Zingiber officinale Roscoe\)](#). (Available in Danish only).

Dissabandara DLO, Chandrasekara MS. (2007). 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. DOI: 10.4038/cjms.v50i1.116 [116-1-474-1-10-20081020.pdf](https://doi.org/10.4038/cjms.v50i1.116).

Egashira, K; Sasaki, H; Higuchi, S; Ieiri, I (2012). [Food-drug Interaction of Tacrolimus with Pomelo, Ginger, and Turmeric Juice in Rats](https://doi.org/10.2133/dmpk.DMPK-11-RG-105), *Drug Metabolism and Pharmacokinetics*, Vol 27, 2, 242-247. <https://doi.org/10.2133/dmpk.DMPK-11-RG-105>.

ElMazoudy, Reda & Attia, Azza. (2018). *Phytomedicine*. 50. 2018, 300-308, [Ginger causes subfertility and abortifacient in mice by targeting both estrous cycle and blastocyst implantation without teratogenesis.](#)

Ensiyeh, J.; Sakineh, M.A. (2009). [Comparing ginger and vitamin b6 for the treatment of nausea and vomiting in pregnancy: A randomised controlled trial.](#) *Midwifery* **2009**, 25, 649–653. <https://doi.org/10.1016/j.midw.2007.10.013>.

European Commission (EC) (2023). Commission Regulation (EU) 2023/915 of 25 April 2023 on maximum levels for certain contaminants in food and repealing Regulation (EC) No 1881/2006. [Publications Office \(europa.eu\)](#).

EMA (European Medicines Agency) (2012): [Assessment report on Zingiber Officinale Roscoe, rhizome](#); EMA/HMPC/577856/2010.

Finnish Food Authority, (2019). [General Instructions on Safe Use of Foodstuffs.](#)

Fischer-Rasmussen, W.; Kjaer, S.K.; Dahl, C.; Asping, U. (1991). [Ginger treatment of hyperemesis gravidarum.](#) *Eur. J. Obstet. Gynecol. Reprod. Biol.* 1991, 38, 19–24. [https://doi.org/10.1016/0028-2243\(91\)90202-v](https://doi.org/10.1016/0028-2243(91)90202-v)

Getaneh, A., Guadie, A., & Tefera, M. (2021). [Levels of heavy metals in ginger \(Zingiber officinale Roscoe\) from selected districts of Central Gondar Zone, Ethiopia and associated health risk.](#) *Heliyon*, 7(4), e06924. <https://doi.org/10.1016/j.heliyon.2021.e06924>.

Ghayur, M. N., & Gilani, A. H. (2005). Ginger lowers blood pressure through blockade of voltage-dependent calcium channels. *Journal of cardiovascular pharmacology*, 45(1), 74-80. DOI: [10.1097/00005344-200501000-00013](https://doi.org/10.1097/00005344-200501000-00013).

Goroya K, Mitiku Z, Asresahegn Y, (2019). [Determination of concentration of heavy metals in ginger using flame atomic absorption spectroscopy.](#) *Afr. J. Plant Sci.* 13, 163–167. DOI: [10.5897/AJPS2019.1787](https://doi.org/10.5897/AJPS2019.1787).

Healthline (2020). [Ginger Tea in Pregnancy: Benefits, Safety, and Directions.](#)

Jiang, X., Williams, K. M., Liauw, W. S., Ammit, A. J., Roufogalis, B. D., Duke, C. C., Day, R. O., & McLachlan, A. J. (2005). Effect of ginkgo and ginger on the pharmacokinetics and pharmacodynamics of warfarin in healthy subjects. *British journal of clinical pharmacology*, 59(4), 425–432. <https://doi.org/10.1111/j.1365-2125.2005.02322.x>.

Karagözoğlu, Y., & Kiran, T. R. (2023). Investigation of Heavy Metal Contents in Thyme (*Thymus vulgaris*) and Ginger (*Zingiber officinale*) Sold in Bingöl Herbalists. *Middle Black Sea Journal of Health Science*, 9(1), 88-97.

<https://doi.org/10.19127/mbsjohs.1203882>

Kilic S, Soylak M (2020). *J Food Sci Technol* 57, 927–933 (2020). Determination of trace element contaminants in herbal teas using ICP-MS by different sample preparation method.

Kim, IS, Kim, SY, Yoo, HH (2012). Effects of an aqueous-ethanolic extract of ginger on cytochrome P450 enzyme-mediated drug metabolism. *Die Pharmazie*, 67(12), 1007–1009.

Kimura Y, Ito H, Hatano T (2010). Effects of mace and nutmeg on human cytochrome P450 3A4 and 2C9 activity. *Biol Pharm Bull.* 2010;33(12):1977-82.

[doi: 10.1248/bpb.33.1977](https://doi.org/10.1248/bpb.33.1977). PMID: 21139236.

Krüth P, Brosi E, Fux R, Mörike K, Gleiter CH (2004). [Ginger-Associated Overanticoagulation by Phenprocoumon](#). *Ann Pharmacother.* Feb;38(2):257-60.

[doi: 10.1345/aph.1D225](https://doi.org/10.1345/aph.1D225).

Lantz, R. C., Chen, G. J., Sarihan, M., Sólyom, A. M., Jolad, S. D., & Timmermann, B. N. (2007). The effect of extracts from ginger rhizome on inflammatory mediator production. *Phytomedicine: international journal of phytotherapy and phytopharmacology*, 14(2-3), 123–128.

<https://doi.org/10.1016/j.phymed.2006.03.003>.

Laekeman, G. M., Van Calsteren, K., Devlieger, R., Sarafanova, E., Van Limbeek, J., & Dierckxsens, Y. (2021). Ginger (*Zingiber officinale*) root extract during pregnancy: a clinical feasibility study. *Planta Medica*, 87(10/11), 907-912. DOI: [10.1007/s00228-012-1331-5](https://doi.org/10.1007/s00228-012-1331-5).

Lippolis V, Irurhe O, Porricelli, ACR, Cortese M, Schena R, Imafidon T, Oluwadun A, Pascale M (2017). [Natural co-occurrence of aflatoxins and ochratoxin A in ginger \(*Zingiber officinale*\) from Nigeria](#). *Food Control* 2017, 73, 1061–1067.

Lumb A. B. (1994). Effect of dried ginger on human platelet function. *Thrombosis and haemostasis*, 71(1), 110–111. PMID: 8165628.

Luo, L., Zhu, S., Akbari, A., & Tan, B. (2022). Ginger could improve gestational diabetes by targeting genes involved in nutrient metabolism, oxidative stress, inflammation, and the WNT/ β -Catenin/GSK3 β signaling pathway. *Natural Product*

Communications, 17(12). <https://doi.org/10.1177/1934578X221141276>.

Matthews, A., Haas, D. M., O'Mathúna, D. P., & Dowswell, T. (2015). Interventions for nausea and vomiting in early pregnancy. Cochrane Database of Systematic Reviews, (9). <https://doi.org/10.1002/14651858.CD007575.pub4>.

Mohammed, OJ, Latif, ML Pratten, MK(2016). Evaluation of embryotoxicity for major components of herbal extracts using the chick embryonic heart micromass and mouse D3 embryonic stem cell systems. Reproductive Toxicology, Vol 59, 2016, 117-127, ISSN 0890-6238, <https://doi.org/10.1016/j.reprotox.2015.12.003> .

Mother and baby (2022) [Ginger in pregnancy: Safety, benefits and guidelines](#).

Mukkavilli, R., Gundala, S. R., Yang, C., Donthamsetty, S., Cantuaria, G., Jadhav, G. R., Vangala, S., Reid, M. D., & Aneja, R. (2014). [Modulation of cytochrome P450 metabolism and transport across intestinal epithelial barrier by ginger biophenolics](#). PloS one, 9(9), e108386. <https://doi.org/10.1371/journal.pone.0108386>.

Nirmala, K., Prasanna Krishna T. and Polasa, K. (2007). In vivo Antimutagenic Potential of Ginger on Formation and Excretion of Urinary Mutagens in Rats. International Journal of Cancer Research, 3: 134-142. <https://doi.org/10.3923/ijcr.2007.134.142>.

NICE (2021). Antenatal care. Management of nausea and vomiting in pregnancy. [NG201 Evidence review R](#).

NHS (2021) Vomiting and morning sickness. [Vomiting and morning sickness - NHS](#) Accessed: 10/08/2023.

NHS (2021) Women and Health. [Nausea and vomiting in pregnancy](#).

NHS Specialist Pharmacy Service (2022). Herbal medicines: safety during pregnancy. [Page not found - SPS - Specialist Pharmacy Service - The first stop for professional medicines advice](#).

Okonta JM, Ubob M, Obonga WO. (2008). [Herb-drug interaction: a case study of effect of ginger on the pharmacokinetic of metronidazole in rabbit](#). Indian J Pharm Sci. 2008 Mar-Apr;70(2):230-2. doi: 10.4103/0250-474X.41462. PMID: 20046719; PMCID: PMC2792472.

Omotayo, O. P., Omotayo, A. O., Babalola, O. O., & Mwanza, M. (2019). [Comparative study of aflatoxin contamination of winter and summer ginger from](#)

[the North West Province of South Africa](#). Toxicology reports, 6, 489–495.
<https://doi.org/10.1016/j.toxrep.2019.05.011>.

Park, S. A., Park, I. H., Cho, J. S., Moon, Y. M., Lee, S. H., Kim, T. H., ... & Lee, H. M. (2012). Effect of [6]-gingerol on myofibroblast differentiation in transforming growth factor beta 1-induced nasal polyp-derived fibroblasts. *American Journal of Rhinology & Allergy*, 26(2), 97-103. <https://doi.org/10.2500/ajra.2012.26.3736>.

Peneme B.M.L., Akassa, H., Ondélé, R., Lanzah A, B., Backala, A., Etou Ossibi, A. W., and Abena, A. A., (2023). Effects of the Aqueous Extract of the Rhizomes of *Zingiber officinale* (Ginger) on Sexual Parameters in Female Wistar Rats. *European Journal of Medicinal Plants*, 34(10), 1-11.
<https://doi.org/10.9734/ejmp/2023/v34i101161>.

Plengsuriyakarn, T.; Viyanant, V.; Eursitthichai, V.; Tesana, S.; Chaijaroenkul, W.; Itharat, A.; Na-Bangchang, K. (2012). [Cytotoxicity, Toxicity, and Anticancer Activity of *Zingiber Officinale* Roscoe Against Cholangiocarcinoma](#), **Asian Pacific Organization for Cancer Prevention**, 13(9), pp. 4597–4606.
[doi: 10.7314/apjcp.2012.13.9.4597](https://doi.org/10.7314/apjcp.2012.13.9.4597).

Portnoi, G., Chng, L. A., Karimi-Tabesh, L., Koren, G., Tan, M. P., & Einarson, A. (2003). [Prospective comparative study of the safety and effectiveness of ginger for the treatment of nausea and vomiting in pregnancy](#). **American Journal of Obstetrics and Gynecology**, 189(5), 1374–1377. [https://doi.org/10.1067/s0002-9378\(03\)00649-5](https://doi.org/10.1067/s0002-9378(03)00649-5)

Qiu, J. X., Zhou, Z. W., He, Z. X., Zhang, X., Zhou, S. F., & Zhu, S. (2015). Estimation of the binding modes with important human cytochrome P450 enzymes, drug interaction potential, pharmacokinetics, and hepatotoxicity of ginger components using molecular docking, computational, and pharmacokinetic modeling studies. *Drug design, development and therapy*, 841-866.
[DOI:10.2147/DDDT.S74669](https://doi.org/10.2147/DDDT.S74669).

Raoufi, M. F., Farahani, T. M., Jadidi, E. S. M. S., & Gardeshi, T. M. (2023). Protective Effects of Ginger Extract on Oxidative Stress and Steroidogenesis-related Genes in The Ovary of Streptozotocin-induced Diabetic Rats. *International Journal of Medical Laboratory*. <https://doi.org/10.18502/ijml.v10i3.13750>.

Rubin D, Patel V, Dietrich E. (2019). [Effects of Oral Ginger Supplementation on the INR](#). *Case Rep Med*. Jun 11; 2019:8784029. doi:10.1155/2019/8784029. PMID: 31281366; PMCID: PMC6594244.

Shalaby, M.A.; Hamowieh, A.R. (2010) Safety and efficacy of Zingiber officinale roots on fertility of male diabetic rats, Food and Chemical Toxicology, Vol 48, Issue 10, 2920-2924, <https://doi.org/10.1016/j.fct.2010.07.028>.

Smith, C; Crowther, C; Willson, K; Hotham, N; McMillian, V. (2004). [A Randomized Controlled Trial of Ginger to Treat Nausea and Vomiting in Pregnancy](#). **Obstetrics and Gynecology**. 103. 639-45. [DOI: 10.1097/01.AOG.0000118307.19798.ec](https://doi.org/10.1097/01.AOG.0000118307.19798.ec).

Soudamini KK, Unnikrishnan MC, Sukumaran K, Kuttan R (1995). Mutagenicity and anti-mutagenicity of selected spices. Indian J Physiol Pharmacol, 39: 347-353.

Srivas K. C. (1984). Effects of aqueous extracts of onion, garlic and ginger on platelet aggregation and metabolism of arachidonic acid in the blood vascular system: *in vitro* study. Prostaglandins, leukotrienes, and medicine, 13(2), 227-235. [https://doi.org/10.1016/0262-1746\(84\)90014-3](https://doi.org/10.1016/0262-1746(84)90014-3).

Srivastava KC (1986). [Isolation and effects of some ginger components of platelet aggregation and eicosanoid biosynthesis](#). **Prostaglandins Leukot Med**. Dec;25(2-3): 187-98. [doi: 10.1016/0262-1746\(86\)90065-x](https://doi.org/10.1016/0262-1746(86)90065-x). PMID: 3103137.

Srivastava KC (1989). [Effect of onion and ginger consumption on platelet thromboxane production in humans](#). **Prostaglandins Leukot Essent Fatty Acids. Mar**; 35(3):183-5. [doi: 10.1016/0952-3278\(89\)90122-1](https://doi.org/10.1016/0952-3278(89)90122-1) PMID: 2710801.

Stanisiere, J., Mousset, P. Y., & Lafay, S. (2018). [How Safe Is Ginger Rhizome for Decreasing Nausea and Vomiting in Women during Early Pregnancy?](#) **Foods (Basel, Switzerland)**, 7(4), 50. <https://doi.org/10.3390/foods7040050>

Thomson M, Al-Qattan KK, Al-Sawan SM, Alnaqeeb MA, Khan I, Ali M (2002). [The use of ginger \(Zingiber officinale Rosc.\) as a potential anti-inflammatory and antithrombotic agent](#). Prostaglandins Leukot Essent Fatty Acids. Dec; 67(6):475-8. [DOI: 10.1054/plf.2002.0441](https://doi.org/10.1054/plf.2002.0441). PMID: 12468270.

Tiran, D. (2012). [Ginger to reduce nausea and vomiting during pregnancy: Evidence of effectiveness is not the same as proof of safety](#). **Complementary Therapies in Clinical Practice** 18 (2012) 22-25.

Vutyavanich T, Kraissarin T, Ruangsri R. (2001). [Ginger for nausea and vomiting in pregnancy: randomized, double-masked, placebo-controlled trial](#). **Obstet Gynecol**. 2001 Apr;97(4): 577-82. [DOI: 10.1016/s0029-7844\(00\)01228-x](https://doi.org/10.1016/s0029-7844(00)01228-x). PMID: 11275030.

- Wagesho Y, Chandravanshi BS, (2015). [Levels of essential and non-essential metals in ginger \(Zingiber officinale\) cultivated in Ethiopia](https://doi.org/10.1186/s40064-015-0899-5). SpringerPlus 4, 1-13. <https://doi.org/10.1186/s40064-015-0899-5>.
- Wen J, Kong W, Hu Y, Wang J, Yang M (2014). [Multi-Mycotoxins analysis in ginger and related products by UHPLC-FLR detection and LC-MS/MS confirmation](https://doi.org/10.1016/j.foodcont.2014.02.038). Food Control 2014, 43, 82-87. doi: [10.1016/j.foodcont.2014.02.038](https://doi.org/10.1016/j.foodcont.2014.02.038).
- Willetts KE, Ekangaki A, Eden JA. (2003). [Effect of a ginger extract on pregnancy-induced nausea: a randomised controlled trial](https://doi.org/10.1046/j.0004-8666.2003.00039.x). Aust N Z J Obstet Gynaecol. 2003 Apr;43(2):139-44. doi: [10.1046/j.0004-8666.2003.00039.x](https://doi.org/10.1046/j.0004-8666.2003.00039.x). PMID: 14712970.
- Wilkinson, J. M. (2000). Effect of ginger tea on the fetal development of Sprague-Dawley rats. Reproductive Toxicology, 14(6), 507-512. DOI: [10.1016/s0890-6238\(00\)00106-4](https://doi.org/10.1016/s0890-6238(00)00106-4)
- Xu J, Zhang J, Lv Y, Xu K, Lu S, Xiaohui Liu, Yang Y, (2020). Effect of soil mercury pollution on ginger (Zingiber officinale Roscoe): [Growth, product quality, health risks and silicon mitigation](https://doi.org/10.1016/j.ecoenv.2020.110472). Ecotoxicology and Environmental Safety, Volume 195, 2020, 110472, ISSN 0147-6513. <https://doi.org/10.1016/j.ecoenv.2020.110472>.
- Young HY, Liao JC, Chang YS, Luo YL, Lu MC, Peng WH (2006). [Synergistic effect of ginger and nifedipine on human platelet aggregation: a study in hypertensive patients and normal volunteers](https://doi.org/10.1142/s0192415x06004089). **The American Journal of Chinese Medicine**. 34(4):545-551. DOI: [10.1142/s0192415x06004089](https://doi.org/10.1142/s0192415x06004089)
- Yu, Y., Zick, S., Li, X., Zou, P., Wright, B., & Sun, D. (2011). [Examination of the pharmacokinetics of active ingredients of ginger in humans](https://doi.org/10.1208/s12248-011-9286-5). The AAPS journal, 13(3), 417-426. <https://doi.org/10.1208/s12248-011-9286-5>.
- Verma, S. K., Singh, J., Khamesra, R., & Bordia, A. (1993). Effect of ginger on platelet aggregation in man. The Indian journal of medical research, 98, 240-242.
- Zaeoung, S.; Plubrukarn, A.; Keawpradub, N. (2005) [Cytotoxic and free radical scavenging activities of zingiberaceous rhizomes](https://doi.org/10.1016/j.sci.2005.07.001). **Songklanakarinn J. Sci. Technol.** 2005, 27, 799-812.