

Echinacea

Selected References:

- Barcz E, et al. 2007. Influence of Echinacea purpurea intake during pregnancy on fetal growth and tissue angiogenic activity. *Folia Histochemica et Cytobiologica* 45:Supp. 1; 35-39.
- Chow G, et al. 2006. Dietary echinacea purpurea during murine pregnancy: Effect on maternal hemopoiesis and fetal growth. *Biol Neonate*; 89: 133-138.
- Gallo M, et al. 2000. Pregnancy outcome following gestational exposure to echinacea. *Arch Intern Med*. 160:3141-3143.
- Heitmann K, et al. 2016. Pregnancy outcome after prenatal exposure to echinacea: The Norwegian Mother and Child Cohort Study. *Eur J Clin Pharmacol*. 72(5): 623-630.
- Huntley AL, et al. 2005. The safety of herbal medicinal products derived from Echinacea species. *Drug Saf* 28(5):387-400.
- Lewicka A, et al. 2019. Supplementation of plants with immunomodulatory properties during pregnancy and lactation—maternal and offspring health effects. *Nutrients* 11(8):1958.
- Linde K, et al. 2009. Echinacea for preventing and treating the common cold. *Cochrane Database of Systematic Reviews* 2(2):CD000530
- Matthias A, et al. 2008. Bioavailability of Echinacea alkamides in human breast milk. *Planta Med*; 74-SL59.
- Natural Standard (Ed). *Herbs & Supplements – Echinacea (E. angustifolia DC, E. pallida, E. purpurea)*. Nature Medicine Quality Standard. [Retrieved on November 2014]. naturalstandard.com
- Ondrizek RR, et al. 1999. Inhibition of human sperm motility by specific herbs used in alternative medicine. *J Assist Reprod Genet*. 16(2):87-91.
- Perri D, et al. 2006. Safety and efficacy of echinacea (*Echinacea angustifolia*, *E. purpurea* and *E. pallida*) during pregnancy and lactation. *Can J Clin Pharmacol* 13(3):e261-7.
- Peprah P, et al 2019. 'We are nothing without herbs': a story of herbal remedies use during pregnancy in rural Ghana. *BMC* 19(1):65.
- Sarecka-Hujar B, Szulc-Musiół B. 2022 Herbal Medicines—Are They Effective and Safe during Pregnancy? *Pharmaceutics*; 14(1):171.

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Selected References:

- Chuang H et al. 2024. Concomitant use of antidepressants and benzodiazepines during pregnancy and associated risk of congenital malformations: a population-based cohort study in Taiwan. ***The Lancet Psychiatry*** 8: 601-10.
- Estazolam. Product labeling. 8/2022. <https://dailymed.nlm.nih.gov/dailymed/fda/fdaDrugXsl.cfm?setid=a1e3b4bf-22e9-430a-a768-4d86ae886c9e&type=display>.

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Echinacea

Selected References:

- American College of Obstetricians and Gynecologists (ACOG). 2017. Update on immunization and pregnancy: tetanus, diphtheria, and pertussis vaccination. Committee Opinion no. 718.
- American College of Obstetricians and Gynecologists (ACOG). 2018. Maternal Immunization. Committee Opinion no. 741.

- American College of Obstetricians and Gynecologists (ACOG). 2019. Influenza vaccination during pregnancy. Committee Opinion no. 732.
- Centers for Disease Control and Prevention (CDC). 2022. Guidelines for vaccinating pregnant women. Available at: <https://www.cdc.gov/vaccines/pregnancy/hcp-toolkit/guidelines.html>
- Centers for Disease Control and Prevention (CDC). 2023. Vaccines During Pregnancy FAQs. Available at: <https://www.cdc.gov/vaccinesafety/concerns/vaccines-during-pregnancy.html>
- Centers for Disease Control and Prevention (CDC). 2020. Vaccinations: breastfeeding guidelines & recommendations. Available at: <https://www.cdc.gov/breastfeeding/breastfeeding-special-circumstances/vaccinations-medications-drugs/vaccinations.html>
- Etti M, et al. 2022. Maternal vaccination: a review of current evidence and recommendations. Am J Obstet Gynecol. Apr;226(4):459-474.
- Giles ML, et al. 2019. The safety of inactivated influenza vaccines in pregnancy for birth outcomes: a systematic review. Hum Vaccin Immunother 15(3):687-699.
- Keller-Stanislawski B, et al. 2014. Safety of immunization during pregnancy: a review of the evidence of selected inactivated and live attenuated vaccines. Vaccine. 32(52):7057-64.
- Ohfuji S, et al. 2020. Safety of influenza vaccination on adverse birth outcomes among pregnant women: A prospective cohort study in Japan. Int J Infect Dis 93:68-76.
- Shafiee A, et al. 2023. COVID-19 vaccination during pregnancy: a systematic review and meta-analysis. BMC Pregnancy Childbirth. Jan 20;23(1):45
- Vygen-Bonnet S, et al. 2020. Safety and effectiveness of acellular pertussis vaccination during pregnancy: a systematic review. BMC Infect Dis 20(1):136.
- Zhang C, et al. 2018. A systematic review and meta-analysis of fetal outcomes following the administration of influenza A/H1N1 vaccination during pregnancy. Int J Gynaecol Obstet 141(2):141-150.

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Echinacea

Selected References:

- Ahmadi R, et al. 2015. International conference of social science, medicine and nursing, Istanbul, Turkey.
- Altshuler LL, et al. 1996. Pharmacologic management of psychiatric illness during pregnancy: Dilemmas and guidelines. *Am J Psychiatry*. 153:592-606.
- Ang MS, et al. 1990. Maternal lithium therapy and polyhydramnios. *Obstet Gynecol*. 76(3 Pt 2):517-519.
- Cohen LS, et al. 1994. A reevaluation of risk of in utero exposure to lithium. *JAMA*. 271(2):146-150.
- Diav-Citrin O, et al. 2014. Pregnancy outcome following in utero exposure to lithium: a prospective, comparative, observational study. *Am Journal of Psychiatry*. 171:785-794.
- Di Florio A, et al. 2017. Lithium use in pregnancy and the risk of cardiac malformations. *N Engl J Med*. 377(9):893.
- Forsberg L, et al. 2017. Maternal mood disorders and lithium exposure in utero were not associated with poor cognitive development during childhood. *Acta Paediatr*. Doi:10.1111/apa.14152.
- Goodnick PJ, et al. 1982 Differences in lithium kinetics between bipolar and unipolar patients. *J Clin Psychopharmacol*. 2:48-50.
- Hastie R, et al. 2021. Maternal lithium use and the risk of adverse pregnancy and neonatal outcomes: a Swedish population-based cohort study. *BMC Med*. 19(1):291.
- Jacobsen SJ, et al. 1992. Prospective multicentre study of pregnancy outcome after lithium exposure during first trimester. *Lancet*. 339:530-533.
- Khan SJ, et al. 2016. Bipolar disorder in pregnancy and postpartum: principles of management. *Curr Psychiatry Rep*. 18(2):13.
- Kozma C. 2005. Neonatal toxicity and transient neurodevelopmental deficits following prenatal exposure to lithium: Another clinical report and review of the literature. *Am J Med Genet*. 132A:441-444.
- Krause S, et al. 1990. Polyhydramnios with maternal lithium treatment. *Obstet Gynecol*. 75(3 Pt 2):504-6.
- Kummerlowe MN, et al. 2024. Retrospective review of postpartum lithium use including during lactation. *Breastfeed Med*. 19(10):796-800.
- Lithium FDA Full Prescribing Information. 2018. Available at: https://www.accessdata.fda.gov/drugsatfda_docs/label/2018/017812s033,018421s032,018558s027lbl.pdf.
- Molenaar NM, et al. 2021, Management of lithium dosing around delivery: an observational study. *Bipolar Disord*. 23(1):49-54.
- Morrell P, et al. 1983. Lithium toxicity in the neonate. *Arch Dis Child*. 58:539-541.
- Newport DJ, et al. 2005. Lithium placental passage and obstetrical outcome: implications for clinical management during date pregnancy. *Am J Psychiatry*. 162(11):2162-2170.
- Paterno E, et al. 2017. Lithium use in pregnancy and the risk of cardiac malformations. *N Engl J Med*. 376(23):2245-54.
- Poels EMP, et al. 2020. Lithium use during pregnancy and the risk of miscarriage. *J Clin Med*. 9(6).
- Poels EMP, et al. 2022. The effect of prenatal lithium exposure on the neuropsychological development of the child. *Bipolar Disord*. 24(3):310-319.
- Raoof NT, et al. 1989. Lithium inhibits human sperm motility in vitro. *Br J Clin Pharmacol*. 28, 715-717.
- Robert E, et al. 1990. Comments on teratogen update on lithium by J. Warkany. *Teratology*. 42:205.
- Schmidt CT, et al. 2023. Transfer of anticonvulsants and lithium into amniotic fluid, umbilical cord blood & breast milk: A systematic review & combined analysis. *Prog Neuropsychopharmacol Biol Psychiatry*. 8;124:110733.
- Schou M. 1990. Lithium treatment during pregnancy, delivery, and lactation: an update. *Journal of Clinical*

Psychiatry. 51(10):410-413.

- Smith CJ, Payne VM. 2024. Epidemiology studies on effects of lithium salts in pregnancy are confounded by the inability to control for other potentially teratogenic factors. *Hum Exp Toxicol*. 43:9603271241236346.
- Stoppa A, et al. 2024. A case of pregnancy with severe polyhydramnios related to long-term use of lithium. *Bipolar Disord*. 26(4):405-408.
- Van der Lugt NM, et al. 2012. Fetal, neonatal and developmental outcomes of lithium-exposed pregnancies. *Early Hum Dev*. 88(6):375-378.
- Viguera AC, et al. 2000. Risk of recurrence of bipolar disorder in pregnant and nonpregnant women after discontinuing lithium maintenance. *Am J Psychiatry*. 157(2):179-184.
- Viguera AC, et al. 2007. Risk of recurrence in women with bipolar disorder during pregnancy: prospective study of mood stabilizer discontinuation. *Am J Psychiatry*. 164(12):1817-1824.
- Viguera AC, et al. 2007. Lithium in breast milk and nursing infants: clinical implications. *Am J Psychiatry*. 164(2):342-345.
- Zivanovic O. 2017. Lithium: A classic drug frequently discussed, but, sadly, seldom prescribed! *Aust N Z J Psychiatry* 48:67417695889.

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Selected References:

- Akhigbe RE, et al. 2022. Codeine alters female reproductive function by targeting ovarian steroidogenesis and folliculogenesis via the induction of oxidative stress, inflammation, and apoptosis, *Reproductive Toxicology* 109: 1-9.
- Azuine RE, et al. 2019. Prenatal risk factors and perinatal and postnatal outcomes associated with maternal opioid exposure in an urban, low-income, multiethnic US population. *JAMA network* 2(6): e196405-196405.
- Berlin CM, Jr, et al. 2009. Safety issues of maternal drug therapy during breastfeeding. *Clinical pharmacology*

and therapeutics 85(1): 20-22.

- Bowie, AC, et al. 2022. Prescribed opioid analgesics in early pregnancy and the risk of congenital anomalies: a population-based cohort study. *CMAJ*. 194(5): E152-E162.
- Bracken MB. 1986. Drug use in pregnancy and congenital heart disease in offspring. *N Engl J Med*. 314(17):1120.
- Bracken MB, Holford TR. 1981. Exposure to prescribed drugs in pregnancy and association with congenital malformations. *Obstet Gynecol*. 58(3):336-344.
- Brogly SB, et al. 2021. Prenatal opioid analgesics and the risk of adverse birth outcomes. *Epidemiology*. 32(3), 448-456.
- Brogly SB, et al. 2023. Safety of prenatal opioid analgesics: Do results differ between public health insurance beneficiary and population-based cohorts? *Birth Defects Res*. 115(5):555-562.
- Broussard CS, et al. 2011. Maternal treatment with opioid analgesics and risk for birth defects. *Am J Obstet Gynecol*. 204(4):314.e1-11.
- Corsi DJ, et al. 2020. Association of Maternal opioid use in pregnancy with adverse perinatal outcomes in Ontario, Canada, From 2012 to 2018. *JAMA Netw Open*. 3(7):e208256.
- Corsi DJ, et al. 2021. The effects of opioids on female fertility, pregnancy and the breastfeeding mother-infant dyad: A Review. *Basic Clin Pharmacol Toxicol*. 128(5):635-641.
- Esposito, DB, et al. 2022. Characteristics of prescription opioid analgesics in pregnancy and risk of neonatal opioid withdrawal syndrome in newborns. *JAMA Netw Open* 5(8): e2228588.
- Fältmarch S, et al. 2019. Use of opioids during pregnancy and effects of pregnancy outcomes. *Pharmacoepidemiol Drug Saf*. 28: 1239- 1245.
- Fishman B, et al. 2019. Pregnancy outcome following opioid exposure: A cohort study. *PLOS ONE* 14(7): e0219061
- Flannagan KS, et al. 2020. Is opioid use safe in women trying to conceive? *Epidemiology*. 31(6): 844-851.
- Fronczak CM, et al. 2012. The insults of illicit drug use on male fertility. *Journal of andrology*. 33(4): 515-528.
- Interrante JD, et al. 2021. Prescription opioid use during pregnancy and risk for preterm birth or term low birthweight. *Journal of opioid management* 17(3):215-225.
- Ito S. 2018. Opioids in breast milk: Pharmacokinetic principles and clinical implications. *The Journal of Clinical Pharmacology*, 58: S151-S163.
- Juurlink DN, et al. 2012. Postpartum maternal codeine therapy and the risk of adverse neonatal outcomes: a retrospective cohort study. *Clinical Toxicol*. 50:5.
- Kallen B, Reis M. 2015. Use of tramadol in early pregnancy and congenital malformation risk. *Reprod Toxicol*. 58:246-251.
- Kelly LE, et al. 2013. A clinical tool for reducing central nervous system depression among neonates exposed to codeine through breast milk. *PLoS ONE*. 8(7):370073.
- Khan K, Chang J. 1997. Neonatal abstinence syndrome due to codeine. *Arch Dis Child*. 76:F59-F60.
- Konijnenberg C, et al. 2022. Verbal and nonverbal memory in school-aged children born to opioid-dependent mothers. *Early human development*, 171, 105614.
- Lazaryan M, et al. 2015. Codeine should not be prescribed for breastfeeding mothers or children under the age of 12. *Acta paediatrica* 104(6): 550-556.
- Lind JN, et al. 2017. Maternal use of opioids during pregnancy and congenital malformations. A Systematic Review. *Pediatrics*. 139(6):e20164131.
- Mactier H, et al. 2020. Prenatal opioid exposure – Increasing evidence of harm. *Early human development*, 150, 105188.
- Mangurten HH. 1980. Neonatal codeine withdrawal in infants of non-addicted mothers. *Pediatrics*. 65:159-160.
- Meny RG, et al. 1993. Codeine and the breastfed neonate. *Journal of human lactation* 9(4): 237-240.
- Nair V, et al. 2012. Neonatal withdrawal syndrome due to maternal codeine use. *Paediatr Child Health*. 17(5):e40-e41.

- Nezvalová-Henriksen K, et al. 2011. Effects of codeine on pregnancy outcomes from a large population-based cohort study. *Eur J Clin Pharmacol*. 67:1253-1261.
- Rothman KJ, et al. 1979. Exogenous hormones and other drug exposures of children with congenital heart disease. *Am J Epidemiol*. 109(4):433-439.
- Rubenstein E, et al. 2019. Brief Report: Maternal opioid prescription from preconception through pregnancy and the odds of autism spectrum disorder and autism features in children. *Journal of autism and developmental disorders*, 49(1): 376-382.
- Saxén I. 1975. Associations between oral clefts and drugs taken during pregnancy. *Int J Epidemiol*. 4(1):37-44.
- Sachs, Hari Cheryl, and Committee On Drugs. 2013. The transfer of drugs and therapeutics into human breast milk: an update on selected topics. *Pediatrics* 132(3): e796-809.
- Shaw GM, et al. 1992. Congenital cardiac anomalies relative to selected maternal exposures and conditions during early pregnancy. *Eur J Epidemiol*. 8(5):757-760.
- Shaw GM, et al. 1998. Maternal illness, including fever and medication use as risk factors for neural tube defects. *Teratology*. 57(1):1-7.
- Semet M, et al. 2017. The impact of drugs on male fertility: a review. *Andrology*, 5(4), 640-663.
- Suján AC, et al. 2019. Maternal prescribed opioid analgesic use during pregnancy and associations with adverse birth outcomes: A population-based study. *PLoS Medicine*. 16(12).
- U.S. Food and Drug Administration. 2017. Use of codeine and tramadol products in breastfeeding women – questions and answers. Available at <https://www.fda.gov/drugs/postmarket-drug-safety-information-patients-and-providers/use-codeine-and-tramadol-products-breastfeeding-women-questions-and-answers>. Accessed 2 June 2025.
- Van Leeuwen G, et al. 1965. Narcotic withdrawal reaction in a newborn infant due to codeine. *Pediatrics*. 36:635-636.
- Varney B, et al. 2024. Opioid analgesic exposure during the first trimester of pregnancy and the risk of major congenital malformations in infants: a systematic review and meta-analysis†. *Anaesthesia*. 79(9):967-977.
- Willmann, S, et al. 2009. Risk to the breast-fed neonate from codeine treatment to the mother: a quantitative mechanistic modeling study. *Clin Pharmacol Ther*. 86, 634-643.
- Yazdy MM, et al. 2013. Periconceptional use of opioids and the risk of neural tube defects. 2013. *Obstet Gynecol*. 122(4):838-844.
- Zierler S, Rothman KJ. 1985. Congenital heart disease in relation to maternal use of Bendectin and other drugs in early pregnancy. *N Engl J Med*. 313(6):347-352.
- Zipursky J, Juurlink DN. 2020. The implausibility of neonatal opioid toxicity from breastfeeding. *Clin Pharmacol Ther*. 108(5):964-970.

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