

A pregnant woman is shown from the waist down, wearing a grey cardigan, blue pants, and tan boots. She is holding a wicker basket in her right hand. The background is a blurred forest floor with fallen leaves and twigs. In the top left corner, there is a white box containing the letters 'mq' in a stylized, lowercase font.

mq

Mushrooms Before, During and After Pregnancy: What We Know

ANNA SITKOFF, ND

Author's Disclaimer

There is really not enough clinical safety information on the use of mushroom supplements throughout pregnancy and breastfeeding to be certain that they are all safe during this time.



Based on what I have gathered from the research and historical use, I conclude that they are likely safe but of course, please ask your midwife and or OB-GYN about what would be right for you specifically. This article is intended for information purposes only.

What We Know

Mushrooms are more readily accessible as supplements to the general public than ever before in the Western world and they carry a reputation of safety during pregnancy. Indeed, the safety of mushrooms as a food source during pregnancy is seldom disputed, unless there is concern around accurate identification of an individual mushroom itself. You won't find culinary mushrooms on any cautionary-pregnancy-food lists because well-cooked mushrooms are widely recognized as a healthy addition to a diet rooted in whole foods, regardless of one's pregnancy status.

As drying, extracting and encapsulating mushrooms for consumption in more concentrated doses grows in popularity, so does speculation: how safe is it to consume these medicinal mushroom extracts during pregnancy? Unlike their counterparts maitake (*Grifola frondosa*), lion's mane (*Hericium* species), shiitake (*Lentinula edodes*) and oyster mushrooms (*Pleurotus* sp.), many medicinal mushrooms such as reishi (*Ganoderma* sp.), turkey tail (*Trametes versicolor*) and chaga (*Inonotus obliquus*) are too fibrous for typical culinary use. This characteristic lands them more definitively in the medicinal category than the food category and, as a result, prompts questions regarding their safety before, during and after pregnancy.

Mushrooms as Food

Numerous “danger” lists outline what to avoid during pregnancy, often more fear driven than fact based—and you won’t find mushrooms on any of these lists. Medicinal mushrooms that are also commonly consumed as food—maitake, lion’s mane, shiitake and oysters—are not just safe but also highly nutritious; incorporating them into your daily diet throughout pregnancy should not pose any concerns.

Mushrooms as Medicine

It’s easier to get a higher dose of bioactive compounds when mushrooms are extracted and encapsulated, begging the key question of this piece: are mushrooms still safe during pregnancy when taken as extracted supplements?

Following is a review of the most relevant research as well as traditional use of mushrooms from the prenatal to postpartum periods.

Prenatal Support

Prenatal support usually has the intention of improving ovulation, regulating hormones, managing stress and ensuring proper nutrition. Mushrooms may be one of the most important foods to consume on the journey to pregnancy—but what about supplements?

Reishi, Maitake and Oyster Mushroom for Prenatal Support

A small clinical trial from 2010 provided women with Polycystic Ovary Syndrome





(PCOS) capsules containing 200mg maitake powder, in addition to 18mg of concentrated MSX (a patented maitake extract from Mushroom Wisdom Inc.) (1). Taken as 3 tablets 3 times daily for a total dose of 1,800 mg maitake and 162 mg MSX, participants improved ovulation to a similar degree as the drug clomiphene citrate, a typical treatment for ovulation induction in PCOS. The

ovulation rate with clomiphene in this trial was 93.5% compared to an ovulation rate with maitake supplementation of 76.9%. Some women in the study did not ovulate with maitake or clomiphene alone and, when the two were combined, ovulation rates in that population increased significantly.

This trial suggests that maitake supplementation is similarly effective as clomiphene at fertility enhancement in patients with ovulatory dysfunction and may be effective for people trying to conceive.

Reishi

Reishi mushroom has been used traditionally for thousands of years to help calm the spirit; in modern Western terms, support a healthy stress response. During the prenatal period, this may be one of the most important aspects of ovulation and conception. Reishi, when given at doses of 2g daily, can help to regulate levels of the stress hormone cortisol (2). When subjected to stress on a daily basis over a long period of time, people may produce too much or too little cortisol, and this cortisol dysregulation can impact sex hormone production, impacting fertility (3,4).

Reishi also regulates excess androgen (testosterone) levels, which can impact fertility in women. In a study exploring the antiandrogenic effects of 20 species of mushrooms, reishi had the strongest effect via reduction in the enzyme 5-alpha reductase, responsible for the conversion of testosterone to dihydrotestosterone, the more biologically active androgen (5).

This research suggests that reishi is helpful in the prenatal period for improving

sex hormone function by supporting cortisol regulation and the inhibition of 5-a-reductase.

Ergothioneine

The amino acid ergothioneine, commonly found in mushrooms, could theoretically be very beneficial during the prenatal period. Ergothioneine is a compound ubiquitous in mushrooms and algae and is found in especially high concentrations in oyster mushrooms. Humans have a very specific transporter for ergothioneine in cells that are more susceptible to oxidative stress/damage and ergothioneine builds up as an antioxidant within cells. It has been postulated that this substance may be useful as a prenatal supplement to establish an antioxidant reserve to prevent and protect against preeclampsia later in pregnancy. In one observational study, women who had a higher concentration of ergothioneine in their plasma were less likely to develop preeclampsia; more on that below (6).

Mushrooms During Pregnancy

Edible mushrooms are not only generally considered safe to consume as food during pregnancy but may actually be helpful in preventing pregnancy-related disease. It is, however, difficult to study herbs and other supplements in human pregnancy, so there is generally very little data on most supplements and natural compounds. To be on the safest side possible, it is generally not recommended to take compounds with unknown safety profiles during pregnancy (please see author's disclaimer at top of this piece).

Eat Your Mushrooms

In a randomized clinical trial, subjects consumed 100g of cooked white button (*Agaricus bisporus*) mushrooms daily in addition to their normal diet from prepregnancy until the 20th week of gestation. Compared to the placebo group, the “mushroom diet” group had a significantly reduced incidence of gestational hypertension, preeclampsia, excessive gestational weight gain and gestational diabetes, suggesting that mushrooms are a beneficial ingredient in diets during pregnancy (7).

Reishi Babies?

Other than this clinical trial, studies exploring mushroom intake in human pregnancy are sparse. There are anecdotal tales of women throughout Asia taking



reishi during pregnancy and giving birth to very calm, zen-like children, AKA “reishi babies.” While I love this idea, and the adaptogenic and HPA-axis-regulating actions of reishi suggest plausibility, I could not find any actual evidence of the practice or the outcome.

Medicinal Mushrooms

While human evidence for mushroom consumption during pregnancy is sparse, there are a number of rodent studies indicating not only safety, but therapeutic value.

Shiitake: Safe in Rodent Pregnancy

Shiitake mushroom is a nutritious and widely consumed food and I have no doubt that it is safe to consume in pregnancy as a “functional” food. There are a few studies in mice and rats supporting my conclusion.

In one rat study, shiitake mushrooms were fed to rats with induced gestational diabetes. Shiitake was given early in these rats’ pregnancies and there was a decrease in preimplantation pregnancy loss compared with the control group. Shiitake had a protective effect on preimplantation parameters, though it was not able to reverse gestational diabetes throughout the pregnancy (8).

In another rat study, consumption of shiitake reduced triglyceride levels and did not correlate with changes in maternal weight and reproductive capacity. There were no morphological changes in the fetuses’ body measurements, suggesting that shiitake is likely safe to ingest throughout pregnancy (9).

Reishi

Another study on pregnant rats with induced diabetes explored the effects of reishi mushroom on the glycemic response in the oral glucose tolerance test as well as other values, including liver function studies and lipid peroxidation. Reishi reduced the glycemic response in the glucose tolerance test, decreased liver enzymes and decreased lipid peroxidation. Levels of important antioxidant enzymes, catalase and glutathione peroxidase, are decreased in patients with gestational diabetes; these levels were improved with reishi administration. In addition to improved blood markers, measurements of the fetal head and thorax were greater in the rats exposed to reishi, indicating healthier fetal body sizes in the reishi-consuming group (10).

Note

Studies on medicinal mushrooms throughout pregnancy are very limited; due to this limitation, customary caution dictates that they are generally considered unsafe unless they are also a known, safe culinary mushroom like lion's mane, maitake, shiitake, oyster, enoki, etc. These food mushrooms, or functional foods, are not only safe during pregnancy but may help to prevent pregnancy complications like preeclampsia and gestational diabetes.

Ergothioneine for Preeclampsia

I mentioned earlier that ergothioneine is a highly bioavailable amino acid found in mushrooms that accumulates in organs that are susceptible to higher levels of oxidative stress, like the endothelial cells lining our blood vessels (11). Preeclampsia, a pregnancy-specific clinical syndrome involving new-onset hypertension (high blood pressure) plus new-onset proteinuria (protein in the urine), is associated with oxidative stress and endothelial cell dysfunction (12). The study mentioned above demonstrated that women with the highest plasma concentration of ergothioneine were less likely to develop preeclampsia. Although there is much more investigation to be done, it is likely that ergothioneine intake in the prenatal period and during pregnancy could help protect against preeclampsia (13).

Ergothioneine: Safe in Rodent Pregnancy

In a rodent study exploring the reproductive safety of ergothioneine, no adverse or toxic effects were noted and ergothioneine was considered to be well tolerated



and without adverse effects in any of the reproductive parameters evaluated (14). Since this study, the European Food Safety Authority concluded that synthetic L-ergothioneine is safe for infants, young children and pregnant and breastfeeding women in the following amounts (in addition to background diet): 2.82 mg/kg body weight per day for infants; 3.39 mg/kg body weight per day for toddlers; and 1.31 mg/kg body weight per day for adults, including pregnant and breastfeeding women (15).

Postpartum Support

For many, postpartum is a complicated time full of deep love, exhaustion and feeling overwhelmed. Medicinal mushrooms can be extremely helpful during this time for keeping the immune system strong, supporting a healthy nervous system and possibly even helping with milk production.

Mushrooms and Breastfeeding

The most-studied medicinal constituents in mushrooms are β -glucans, AKA polysaccharides. It is well known that the main mechanism of immune-modulation from mushrooms occurs via the relationship between 1,3-1,6- β -glucans binding to dectin-1 receptors within the gut associated lymphoid tissue (GALT) within the intestines. Dectin-1 receptors are found elsewhere in the body as well, including the pituitary gland, which plays a major role in hormone production and regulation throughout the human body. The

pituitary gland is also where prolactin, the hormone that stimulates breast milk production, is made.

One study found that β -glucans stimulated prolactin production via dectin-1 receptors (16). β -glucans researched in this study are 1,4- β -glucans, which are found in oats, barley and other grains; however, based on the mechanism of action and interaction with dectin-1, it is likely that fungal β -glucans would have a similar effect.

Reishi and Cordyceps for recovery

In addition to having a potentially positive effect on breast milk production, taking mushrooms while breastfeeding also helps to support the immune and nervous systems of the breastfeeding parent, which is vital after birth. Reishi may be an essential mushroom in the postpartum period to help with sleep, anxiety, cortisol regulation, and immune support.

The combination of reishi and *Cordyceps* could help to maintain energy and regulate the nervous system when there is significant sleep deprivation (17). Mushroom extracts, taken internally and used topically, are also beneficial in all phases of wound healing and may be a helpful addition in bone broths and soups to support tissue repair after vaginal birth and C-section (18). It is important to note that reishi does have mild antiplatelet activity, meaning that it can interfere with blood clotting (19). My review of research indicates that reishi is a good option after all bleeding has stopped; if consumed prior to birth, discontinue one week before vaginal delivery and C-section.

Lion's Mane for Cognitive Support

Besides being rich in β -glucans, which may help with breast milk production, lion's mane may also help with postpartum “mommy brain.” Sleep deprivation, focused attention on a newborn and hormone shifts leave little room for other mental responsibilities. While reishi can help with stress and sleep and *Cordyceps* can help with energy, lion's mane is likely the most helpful for cognitive support during this time for memory, anxiety and depression. After birth, once the placenta is birthed or extracted, sex hormones estradiol and progesterone are quite similar to the low levels found in those going through perimenopause and this hormone shift contributes to mood changes (21). Lion's mane has been

specifically studied in the menopausal population and significant benefit was seen in memory, anxiety and depression dosed at 2g daily, suggesting a similar benefit during the postpartum period (22).

Our Central Question: Mushroom Safety

I have reiterated throughout this guide that mushrooms traditionally eaten as food are widely considered safe as food before, during and after pregnancy. The safety of medicinal mushrooms taken as extracts, however, will remain up for debate. Safety considerations rest on the question of what, specifically, we are concerned about with herbs and supplements surrounding pregnancy; these concerns are mostly related to clotting issues, the potential for miscarriage via various mechanisms and interference with fetal development (teratogenicity).

No medicinal mushrooms, including those discussed in this guide, have medicinal properties or actions that are of concern for any of these potential safety issues. It is and will be, however, impossible to describe them definitively as safe due to the inherent limitations of studying safety among pregnant people in real life. We are constrained by the limits of our epistemology and rely instead on triangulating reasonable conclusions based on the evidence at hand.

Risks to pregnancy and fetal development abound in the first trimester and it is recommended to avoid all products and exposures that have unknown potential consequences during this time. During the second and third trimesters, concerns for fetal development and miscarriage diminish and it becomes more reasonable to expand your horizons. Precautions taken by pregnant parents are often highly individual and based on the personal weighing and balancing of potential risks and benefits. I hope this article has provided enough additional context and information to encourage more informed decisions while recognizing the limits of what we do, and can, possibly know for certain.

Closing Thoughts

I think of Fungi as the doulas of nature. They play an essential role in transformation: in death, decay and rebirth. It is important not only to consider the biochemical mechanisms and clinical research when it comes to using once-living organisms as medicine but to think about and understand the role they play in the natural world, including how that role reflects the way these organisms

act upon mammals energetically when they are consumed as medicine. When thinking about mushrooms in this way, I have no doubt that they would be allies throughout gestation and especially postpartum. 📌

Dr. Anna Sitkoff, ND is a medicinal mushroom researcher, educator, entrepreneur, and practicing naturopathic physician. She can be reached via her website: drannasitkoff.com

Appendix

Author's Pregnancy/Postpartum Mushroom Safety Chart

| | Prenatal | 1st Trimester | 2nd Trimester | 3rd Trimester | Breastfeeding (Postpartum) | Not breastfeeding (Postpartum) |
|----------------------|----------|---------------|---------------|---------------|----------------------------|--------------------------------|
| Reishi | Safe | Unknown | Likely safe | Likely safe | Likely safe | Safe |
| Maitake | Safe | Safe as food | Safe | Safe | Safe | Safe |
| Turkey tail | Safe | Unknown | Likely safe | Likely safe | Likely safe | Safe |
| Oyster | Safe | Safe as food | Likely safe | Likely safe | Safe | Safe |
| Lion's mane | Safe | Safe as food | Likely safe | Likely safe | Likely Safe | Safe |
| Cordyceps | Safe | Unknown | Likely safe | Likely safe | Likely safe | Safe |
| Tremella | Safe | Unknown | Likely safe | Likely Safe | Likely safe | Safe |
| Shiitake | Safe | Safe as food | Safe | Safe | Safe | Safe |
| Chaga | Safe | Unknown | Unknown | Unknown | Unknown | Safe |
| Ergothioneine | Safe | Safe | Safe | Safe | Safe | Safe |

Author's Summary of Potential Benefits Before, During and After Pregnancy

Prenatal

- **Maitake** - Ovulation support
- **Reishi** - Decreases androgens and regulates stress hormones
- **Ergothioneine** - Antioxidant support, preeclampsia prevention

Pregnancy

- **Shiitake** - Immune support, ergothioneine benefits
- **Oyster** - Ergothioneine benefits
- **Maitake** - Immune support
- **Ergothioneine** - Antioxidant support, preeclampsia prevention

Postpartum

- **Reishi** - Stress, sleep, benefits of β -glucans
- **Cordyceps** - Energy, benefits of β glucans
- **Lion's mane** - Memory, anxiety, depression, benefits of β -glucans
- **Turkey tail** - Benefits of β -glucans
- **Tremella** - Benefits of β -glucans
- **Maitake** - Benefits of β -glucans
- **Oyster** - Benefits of β -glucans
- **Shiitake** - Benefits of β -glucans
- β -glucans - Breast milk production, immune support, microbiome support, blood sugar regulation, wound healing

1. Chen JT, Tominaga K, Sato Y, Anzai H, Matsuoka R. Maitake mushroom (*Grifola frondosa*) extract induces ovulation in patients with polycystic ovary syndrome: a possible monotherapy and a combination therapy after failure with first-line clomiphene citrate. *J Altern Complement Med*. 2010 Dec;16(12):1295-9. doi: 10.1089/acm.2009.0696. Epub 2010 Oct 29. PMID: 21034160.
2. Soksawatmakhin, S., & Boonyahotra, W. (n.d.). *Ganoderma lucidum* in chronic fatigue syndrome Preliminary study of the applications of *Ganoderma lucidum* in chronic fatigue syndrome. 262–268.
3. Gleicher N, Seier K, Kushnir VA, Weghofer A, Wu YG, Wang Q, et al. Associations between peripheral androgens and cortisol in infertile women. *J Steroid Biochem Mol Biol* (2016) 158:82–9. doi: 10.1016/j.jsbmb.2016.01.004
4. Wdowiak A, Raczkiwicz D, Janczyk P, Bojar I, Makara-Studzinska M, Wdowiak-Filip A. Interactions of cortisol and prolactin with other selected menstrual cycle hormones affecting the chances of conception in infertile women. *Int J Environ Res Public Health* (2020) 17(20):7537. doi: 10.3390/ijerph17207537
5. Fujita R, Liu J, Shimizu K, Konishi F, Noda K, Kumamoto S, et al. Anti-androgenic activities of *Ganoderma lucidum*. *J Ethnopharmacol*. 2005;102(1):107–12. doi: 10.1016/j.jep.2005.05.041.
6. Kenny LC; SCOPE Consortium; Brown LW, Ortea P, Tuytten R, Kell DB. Relationship between the concentration of ergothioneine in plasma and the likelihood of developing pre-eclampsia. *Biosci Rep*. 2023 Jul 26;43(7):BSR20230160. doi: 10.1042/BSR20230160. PMID: 37278746; PMCID: PMC10326187.
7. Sun L, Niu Z. A mushroom diet reduced the risk of pregnancy-induced hypertension and macrosomia: a randomized clinical trial. *Food Nutr Res*. 2020 Jun 8;64. doi: 10.29219/fnr.v64.4451. PMID: 32577117; PMCID: PMC7286351.
8. Maschio BH, Gentil BC, Caetano ELA, Rodrigues LS, Laurino LF, Spim SRV, Jozala AF, Dos Santos CA, Grotto D, Gerenutti M. Characterization of the Effects of the Shiitake Culinary-Medicinal Mushroom, *Lentinus edodes* (Agaricomycetes), on Severe Gestational Diabetes Mellitus in Rats. *Int J Med Mushrooms*. 2017;19(11):991-1000. doi: 10.1615/IntJMedMushrooms.2017024498. PMID: 29345561.
9. Camargo IF, Caetano ELA, Pickler TB, Gerenutti M, Grotto D. Shiitake Culinary-Medicinal Mushroom, *Lentinus edodes* (Agaricomycetes): Absence of Changes in Maternal Reproductive Performance and Embryofetal Development In Vivo. *Int J Med Mushrooms*. 2020;22(8):781-791. doi: 10.1615/IntJMedMushrooms.2020035680. PMID: 33389872.
10. Viroel FJM, Laurino LF, Caetano ELA, Jozala AF, Spim SRV, Pickler TB, Sercundes MK, Gomes MC, Hataka A, Grotto D, Gerenutti M. *Ganoderma lucidum* Modulates Glucose, Lipid Peroxidation and Hepatic Metabolism in Streptozotocin-Induced Diabetic Pregnant Rats. *Antioxidants* (Basel). 2022 May 24;11(6):1035. doi: 10.3390/antiox11061035. PMID: 35739932; PMCID: PMC9219838.
11. Li RW, Yang C, Sit AS, Kwan YW, Lee SM, Hoi MP, Chan SW, Hausman M, Vanhoutte PM, Leung GP. Uptake and protective effects of ergothioneine in human

- endothelial cells. *J Pharmacol Exp Ther.* 2014 Sep;350(3):691-700. doi: 10.1124/jpet.114.214049. Epub 2014 Jul 14. PMID: 25022513.
12. Aouache R, Biquard L, Vaiman D, Miralles F. Oxidative Stress in Preeclampsia and Placental Diseases. *Int J Mol Sci.* 2018 May 17;19(5):1496. doi: 10.3390/ijms19051496. PMID: 29772777; PMCID: PMC5983711.
 13. Kerley RN, McCarthy C, Kell DB, Kenny LC. The potential therapeutic effects of ergothioneine in pre-eclampsia. *Free Radic Biol Med.* 2018 Mar;117:145-157. doi: 10.1016/j.freeradbiomed.201712.030. Epub 2017 Dec 25. PMID: 29284116.
 14. Forster R, Spézia F, Papineau D, Sabadie C, Erdelmeier I, Moutet M, Yadan JC. Reproductive safety evaluation of L-Ergothioneine. *Food Chem Toxicol.* 2015 Jun;80:85-91. doi: 10.1016/j.fct.2015.02.019. Epub 2015 Feb 28. PMID: 25736892.
 15. EFSA Panel on Dietetic Products, Nutrition and Allergies (NDA); Turck D, Bresson JL, Burlingame B, Dean T, Fairweather-Tait S, Heinonen M, Hirsch-Ernst KI, Mangelsdorf I, McArdle HJ, Naska A, Neuhäuser-Berthold M, Nowicka G, Pentieva K, Sanz Y, Siani A, Sjödin A, Stern M, Tomé D, Vinceti M, Willatts P, Engel KH, Marchelli R, Pötting A, Poulsen M, Schlatter JR, Ackerl R, van Loveren H. Statement on the safety of synthetic l-ergothioneine as a novel food - supplementary dietary exposure and safety assessment for infants and young children, pregnant and breastfeeding women. *EFSA J.* 2017 Nov 13;15(11):e05060. doi: 10.2903/j.efsa.2017.5060. PMID: 32625352; PMCID: PMC7010164.
 16. Shaerzadeh F, Sepehri H, Delphi L. Stimulation of Prolactin Synthesis by α -Glucan via Dectin-1 Receptors in GH3/B6 Cells. *Science Stays True Here" Biological and Chemical Research.* 2015;2015:27-35.
 17. Geng P, Siu KC, Wang Z, Wu JY. Antifatigue Functions and Mechanisms of Edible and Medicinal Mushrooms. *Biomed Res Int.* 2017;2017:9648496. doi: 10.1155/2017/9648496. Epub 2017 Aug 14. PMID: 28890898; PMCID: PMC5584359.
 18. Sharifi-Rad J, Butnariu M, Ezzat SM, Adetunji CO, Imran M, Sobhani SR, Tufail T, Hosseinabadi T, Ramírez-Alarcón K, Martorell M, Maroyi A, Martins N. Mushrooms-Rich Preparations on Wound Healing: From Nutritional to Medicinal Attributes. *Front Pharmacol.* 2020 Sep 16;11:567518. doi: 10.3389/fphar.2020.567518. PMID: 33041809; PMCID: PMC7525158.
 19. Kumaran S, Palani P, Nishanthi R, Kaviyaran V. Studies on screening, isolation and purification of a fibrinolytic protease from an isolate (VK12) of *Ganoderma lucidum* and evaluation of its antithrombotic activity. *Med Mycol J.* 2011;52(2):153-62. doi: 10.3314/jimm.52.153. PMID: 21788727.
 20. Cheah IK, Tang RM, Yew TS, Lim KH, Halliwell B. Administration of Pure Ergothioneine to Healthy Human Subjects: Uptake, Metabolism, and Effects on Biomarkers of Oxidative Damage and Inflammation. *Antioxid Redox Signal.* 2017 Feb 10;26(5):193-206. doi: 10.1089/ars.2016.6778. Epub 2016 Sep 7. PMID: 27488221.
 21. Trifu S, Vladuti A, Popescu A. The neuroendocrinological aspects of pregnancy and postpartum depression. *Acta Endocrinol (Buchar).* 2019 Jul-Sep;15(3):410-415. doi: 10.4183/aeb.2019.410. PMID: 32010366; PMCID: PMC6992410.
 22. Nagano M, Shimizu K, Kondo R, Hayashi C, Sato D, Kitagawa K, Ohnuki K. Reduction of depression and anxiety by 4 weeks *Hericium erinaceus* intake. *Biomed Res.* 2010 Aug;31(4):231-7. doi: 10.2220/biomedres.31.231. PMID: 20834180.