

REVIEW ARTICLE

THE USE OF BOTANICALS DURING PREGNANCY AND LACTATION

Tieraona Low Dog, MD

Women are the largest consumers of healthcare, and this extends to their utilization of complementary and alternative medicine (CAM). Researchers have attempted to uncover the reasons why women turn to CAM in general and to botanical medicine in particular. Desire to have personal control over their health has been cited as the strongest motive for women to use herbal medicine. Second was dissatisfaction with conventional treatment and its disregard for a holistic approach, as well as concerns about the side effects of medications.¹ These concerns may explain, in part, the fact that many women use herbal remedies during pregnancy. A survey of 578 pregnant women in the eastern United States reported that 45% of respondents had used herbal medicines,² and a survey of 588 women in Australia revealed that 36% had used at least 1 herbal product during pregnancy.² Women probably feel comfortable using herbal remedies because of their perceived safety, easy access, and the widespread availability of information about them (ie, Internet, magazines, books).

While it is true that many botanicals are mild in both treatment effects and side effects, the data regarding safety during pregnancy are very limited. Given the small sample

sizes in clinical trials studying botanicals in pregnant women, only large differences in measures of pregnancy outcomes would likely be detected. For example, if an herb were thought to increase the rate of spontaneous abortion from 6% to 7%, a sample size of more than 19 000 women would be needed. It is highly unlikely that there will be any studies of a botanical (or drug) with this large a sample size. So when addressing the safety of an herb during pregnancy, we must look at the totality of the evidence, which includes traditional and contemporary use, animal studies, pharmacological studies, and clinical trial data, when available.

Survey data tell us that women often do not share their use of herbal remedies with their healthcare providers due to fear of offending providers or to the belief that clinicians will be ignorant about their use. Practitioners should maintain an open and respectful demeanor when counseling pregnant and nursing women about the use of botanical medicines, and they should know how to access unbiased and authoritative information sources, so they may reliably answer questions on inadvertent exposures and provide guidance on herbal products that might be beneficial. (*Altern Ther Health Med*. 2009;15(1):54-58.)

Tieraona Low Dog, MD, is director of the fellowship at Arizona Center for Integrative Medicine, University of Arizona Health Sciences Center, Tucson.

Editor's note: The following article is excerpted from a chapter of The H.E.R.B.A.L. Guide: Evidence-Based Dietary Supplement Resources for the Clinician, edited by Robert Bonakdar, MD, who works at the Scripps Center for Integrative Medicine. The book is in press and will be available from Lippincott Williams & Wilkins later in 2009.

The topic of herb use during pregnancy or breastfeeding is very large and clearly cannot be extensively covered in this article. What follows is a review of several botanicals that are either commonly used or have documented evidence of benefit for some of the common problems women encounter during these times.

NAUSEA AND VOMITING OF PREGNANCY

Nausea and vomiting of pregnancy (NVP) is a common

experience for many women (33%-50%), usually beginning by 4 to 8 weeks' gestation and disappearing by the 16th week. The etiology is not known. Mild cases of morning sickness generally pose no significant risk to mother or baby and can be safely treated at home with self-care measures. The diagnosis of *hyperemesis gravidarum* is made when NVP is serious enough to cause a weight loss of at least 5% of the prepregnancy weight, dehydration, electrolyte imbalance, and ketosis. This condition necessitates hospitalization.³

Case

Kathy is in the first trimester of her second pregnancy. She had a terrible time with nausea and vomiting during her first pregnancy and was hospitalized for dehydration. She is experiencing nausea and occasional vomiting and is routinely late for work, as she feels too sick to drive. Kathy says that her employer and husband are sympathetic and supportive. She has no health problems and does not take any prescription or over-the-counter medications except for her prenatal vitamin. She recently read that ginger was helpful for morning sickness. Kathy mentioned it to her obstetrician, who told her that ginger was not safe during pregnancy and that the FDA does not regulate

dietary supplements, making them risky to use. He told her to try soda crackers and small frequent meals, which have not helped.

In addition to its long history of use as a spice, ginger (*Zingiber officinale*) is also highly regarded as an antiemetic, an antiinflammatory, a digestive aid, a diaphoretic, and a warming agent. It is also the most extensively studied botanical for NVP. A systematic review of 6 published clinical trials found that ginger, at doses of 1.0 to 1.5 g, is effective for reducing NVP.⁴ Four of the 6 randomized controlled trials (RCTs) (n=246) showed superiority of ginger over placebo; the other 2 RCTs (n=429) found ginger as effective as vitamin B₆ in relieving the severity of nausea and vomiting episodes.

There has been some concern about the use of ginger during pregnancy, largely due to the publication of *The Complete German Commission E Monographs* in English, which state that ginger is contraindicated during pregnancy.⁵ In a controlled experimental rat study, however, ginger failed to demonstrate maternal or developmental toxicity at doses up to 1000 mg/kg per day of body weight.⁶ When pregnant Sprague-Dawley rats were administered 20 g/L or 50 g/L ginger tea via their drinking water from gestation day 6 to day 15 and then sacrificed at day 20, no maternal toxicity was observed; however, embryonic loss in the treatment groups was double that of the controls ($P<.05$).⁷

Researchers at the Hospital for Sick Children in Toronto, Canada, conducted a prospective observational study in which they followed 187 pregnant women who used some form of ginger in the first trimester. The risk of these mothers having a baby with a congenital malformation was no higher than that of women in a control group.⁸ The follow-up of RCTs consistently shows that there are no significant side effects or adverse effects on pregnancy outcomes.⁴

In summary, based upon traditional use, modern use in the population as a spice, animal data, as well as clinical trials, we can assume with some degree of assurance that ginger at doses of 1.0 to 1.5 g per day is a safe and effective remedy for NVP.

Vitamin B₆, or vitamin B₆ plus doxylamine, is safe and effective and should be considered first-line pharmacotherapy. A single 25-mg dose of the antihistamine doxylamine (Unisom) tablet taken at night can be used in combination with vitamin B₆ (10-25 mg 3 times daily).⁹ Acupressure was found in 6 of 7 randomized trials to be effective for relieving morning sickness.¹⁰ Acupressure wristbands are readily available over the counter, and many women find them a less expensive alternative to acupuncture.

URINARY TRACT INFECTION

Urinary tract infections (UTIs) are common in pregnancy; up to 90% are due to the gram-negative bacteria *Escherichia coli*. Pregnancy increases the risk of UTI because increased bladder volume and decreased bladder and ureteral tone increase urinary stasis and ureterovesical reflux.¹¹ Up to 70% of pregnant women develop glycosuria, which encourages bacterial growth in the urine.¹² Untreated asymptomatic bacteriuria can lead to the development of pyelonephritis in up to 50% of cases and is associated with an increased risk of intrauterine growth retardation

and low-birth-weight infants. Thus, routine screening is advocated. The US Preventative Services Task Force recommends a urine culture be obtained between 12 and 16 weeks of gestation.¹³

Case

Shelly is a G3P2 and is being seen for her first prenatal visit at 9 weeks. She has had 2 healthy children, born vaginally at term, and is excited about her current pregnancy. Her exam is normal except for the presence of bacteria in her urine. She denies any dysuria, frequency, or urgency. Shelly is frustrated at the prospect of taking antibiotics, as she ended up on suppressive therapy during her last pregnancy because of recurrent asymptomatic bacteriuria. She wants to know if there is anything else she can try.

Cranberry (*Vaccinium macrocarpon*) reduces the frequency of UTI by preventing the adherence of pathogenic *E coli* and other fimbriated bacteria to the urinary epithelium. A Cochrane review reported that cranberry significantly reduces the incidence of UTIs at 12 months (RR 0.65, 95% CI 0.46-0.90) as compared to placebo/control.¹⁴ Cranberry extracts in tablet form also reduce the risk of UTI and are often more convenient and better tolerated. There are no significant safety concerns for cranberry products during pregnancy and given the significant morbidity that can occur, it seems common sense to recommend it for prevention. Though not studied to the same degree as cranberry, blueberries and blueberry juice appear to exhibit similar activity.¹⁵ The typical dose is 4 oz cranberry juice 2 times per day or 400 mg cranberry extract twice daily.

Uva ursi (*Arctostaphylos uva-ursi*), also known as bearberry, is endorsed by the European Scientific Cooperative on Phytotherapy and the German Commission E for minor infection/inflammatory disorders of the lower urinary tract. Arbutin, an active compound in uva ursi leaf, has antibacterial activity against *E coli*, *Pseudomonas aeruginosa*, *Proteus mirabilis*, and *Staphylococcus aureus*.¹⁶ Uva ursi reduced the risk of recurrent UTI in a 12-month study of 57 women who had at least 3 documented UTIs in the previous year when compared to placebo.¹⁷ Unfortunately for Shelly, both the German Commission E and the American Herbal Products Association¹⁸ contraindicate the use of uva ursi during pregnancy, likely due to the potential for hydroquinone toxicity in the fetus. Exposure of human lymphocytes and cell lines to hydroquinone has been shown to cause various forms of genetic damage.¹⁹ Uva ursi is also contraindicated during lactation.⁵

The use of cornsilk (*Zea mays*) for afflictions of the kidney and bladder can be traced back to the Incas. Parke-Davis introduced a cornsilk product in the 1880s for the treatment of urinary pain and spasm. The *British Herbal Compendium* lists cornsilk as a mild diuretic and urinary demulcent. Cornsilk is quite safe and often included in herbal formulas designed to ease the pain of cystitis. No contraindications are found in the literature.

PARTUS PREPARATORS AND LABOR AIDS

Case

Kathy responded to the combination of an acupressure bracelet and ginger capsules for the nausea and vomiting she experienced during

her first trimester. She has had an easy pregnancy and is now in her 34th week. She returns to your office with an herbal product her friend used during her last pregnancy. The label says it contains blue cohosh (*Caulophyllum thalictroides*), black cohosh (*Actaea racemosa*), and raspberry (*Rubus* spp). Kathy's friend said that it was "simply amazing" and that if a woman takes the product 6 weeks before her due date, it will "essentially guarantee a timely and painless birth." Kathy's first pregnancy ended in an induction when she went 2 weeks past her due date, and though she had prepared for natural childbirth, she had an epidural for the pain. She is feeling a little anxious and wants to know if these herbs are safe and if they can really help ensure a timely and less painful birth.

Since ancient times, pregnant women have used and midwives have recommended herbs to facilitate labor. These preparations are often referred to as *partus preparators*. Depending upon the herb, these labor aids were taken anywhere from a few days to a month before the suspected due date. Indigenous North American women used blue cohosh to induce labor or stimulate sluggish, ineffective contractions. It was official in the USP as a labor-inducing agent from 1882 to 1905 and the NF from 1916 to 1950. There has been little contemporary data to explore its effectiveness as a labor aid.

Blue cohosh is found in many formulations marketed to women as *partus preparators*. Many obstetricians are unfamiliar with its use, but a survey of nurse midwives in 1999 found that 64% used blue cohosh, often in combination with black cohosh, to augment labor during delivery.²⁰ While many used blue cohosh, they also reported having the least comfort with its use during pregnancy as compared to other herbs. A significant number reported observing an increased rate of meconium, tachycardia, and need for resuscitation in association with its use.

There have been a small number of case reports implicating blue cohosh, often in combination with black cohosh and/or other herbs, with myocardial infarction,²¹ multiorgan failure, congestive heart failure,²² and perinatal stroke²³ in infants born to mothers taking the herb several weeks before birth. While the published case reports are not conclusive, blue cohosh contains some potentially dangerous compounds that should give clinicians pause. Blue cohosh contains caulosaponin, a glycoside that has been shown to constrict coronary vessels and likely accounts for its oxytocic effects.²⁴ It also contains N-methylcytisine, an alkaloid with action similar to nicotine, known to cause coronary vasoconstriction, tachycardia, hypotension, and respiratory depression.²⁵ In vitro studies show that extracts of blue cohosh rhizome or pure N-methylcytisine (at 20 ppm) induce major malformations in cultured rat embryos.²⁶ The concentration of N-methylcytisine in dietary supplements containing blue cohosh ranges from 5 to 850 ppm.²⁷

The question immediately before the healthcare professional is what to say to a woman regarding the safety and use of blue cohosh during pregnancy. Despite the shortcomings of published case reports, the chemistry and pharmacology of the plant are reasonably well known. The human case reports, as incomplete as they are, paint a picture that is consistent with the evi-

dence provided by in vitro and animal studies. At this time, it is wise to err on the side of caution and counsel against its use during pregnancy.

Black cohosh (*Actaea racemosa*, *Cimicifuga racemosa*) is probably best known for its use in menopause, though it was traditionally used for rheumatic pain and uterine cramping and to ease melancholy. The German health authorities also recognize its use for dysmenorrhea. It is unrelated to blue cohosh, but the two herbs are often used in combination to induce labor or as a *partus preparator*. Studies on other *Cimicifuga* species failed to show teratogenicity in female rats at doses up to 2000 mg/kg per day²⁸; however, similar studies in *Actaea racemosa* have not been published. Both the British Herbal Pharmacopoeia²⁹ and American Herbal Products Association contraindicate the use of black cohosh during pregnancy.¹⁸ Reproductive toxicology studies are definitely needed for this herb.

Raspberry leaf (*Rubus idaeus*, *R. occidentalis*) can be found in many popular "pregnancy teas." It is often promoted to prevent miscarriage, ease morning sickness, and ensure a quick birth. A survey of 172 certified nurse midwives found that 63% of midwives using herbal preparations recommended red raspberry leaf.²⁰

A retrospective study of women taking raspberry leaf from 30 to 35 weeks onward failed to find any significant adverse outcomes in mother or infant compared to controls.³⁰ A double-blind, placebo-controlled study randomized 192 low-risk, nulliparous women to receive raspberry leaf tablets (2 tablets of 1.2 g per day) or placebo from 32 weeks' gestation until delivery.³¹ Raspberry leaf was not associated with any adverse effects in mother or baby but contrary to popular belief did not shorten the first stage of labor. Clinically significant findings were a shortening of the second stage of labor (mean difference, 9.59 minutes) and a lower rate of forceps deliveries between the treatment group and the control group (19.3% vs 30.4%). No contraindications for use in pregnancy or lactation are found in the literature.

LACTATION

Although the benefits of breastfeeding may be self-evident, they are also increasingly demonstrated by science. Benefits include the superior nutritional composition of breast milk,³² reduced incidence of feeding intolerance and necrotizing enterocolitis in preterm infants,³³ and enhanced resistance to infectious disease.³⁴ There is also a significant psychological benefit for both mother and infant. It is beyond the scope of this brief article to explore the myriad of ways botanical medicine could be safely used by breastfeeding women for conditions such as sore nipples, engorgement, early mastitis, nipple thrush, postpartum depression, etc. Instead, this article will be limited to a discussion of lactagogues.

Lactagogues, or galactagogues, are substances that aid in the initiation, maintenance, or augmentation of milk production. Common indications include increasing milk production after maternal or infant illness or separation, reestablishment of milk supply after weaning, or induction of lactation in a woman who did not give birth to the infant (eg, adoption). Maternal milk

production is a complex process. Dopamine agonists inhibit, whereas dopamine antagonists increase, prolactin and milk production. Although some lactagogues act as dopamine antagonists, the mechanism of action for most is simply not known.

Case

Anna is a 27-year-old single mother of a 9-week healthy son born at term. Anna has recently started back to work part-time and is concerned that her milk supply is faltering. She is trying to pump, but "it isn't going very well." Anna had been successfully breastfeeding prior to returning to her job. The baby appears healthy and hydrated. You observe Anna using the breast pump and make appropriate recommendations. Anna returns 6 weeks later for the baby's immunizations, and you ask how the breastfeeding is going. Anna tells you that her mother gave her a tea of fenugreek and shatavari and laughingly reports that she is making enough milk to feed the neighborhood.

Around the world and throughout history, women have used herbs and foods to enhance their milk supply. In spite of formal scientific evaluation, many are widely recommended. Herbs commonly mentioned in the literature include fenugreek, goat's rue, milk thistle, blessed thistle, shatavari, aniseed, caraway seed, dill, borage, and comfrey.

Fenugreek (*Trigonella foenum-graecum*) has been valued as a spice and medicine throughout India and the Middle East for millennia. The seeds are used to relieve intestinal gas and respiratory congestion, and in larger doses, it can reduce serum cholesterol and glucose levels. Fenugreek has a substantial reputation for increasing breast-milk production in nursing mothers. A case report summarized the anecdotal use of fenugreek in at least 1200 women who reported an increase in milk supply within 24 to 72 hours.³⁵ Two small preliminary reports also suggest effectiveness,^{36,37} yet in spite of its widespread use, there are no rigorous trials for review. Well-tolerated, ingestion of fenugreek can impart a maple-like odor to sweat, milk, and urine, which could lead a practitioner to mistakenly consider the diagnosis of maple syrup–urine disease (branched-chain hyperaminoaciduria), a rare inherited metabolic disorder, in a breastfed infant whose mother is taking the herb. There is crossreactivity in those with chickpea allergy. There are numerous cautionary statements in the literature regarding hypoglycemia with fenugreek use, though blood sugar–lowering activity is mild and seen only at doses exceeding 25 g per day. The usual dose for lactagogue effect is 1 to 2 g of the dried powdered seeds taken 3 times per day. Fenugreek can also be prepared as tea, steeping a quarter teaspoon of seeds in 8 oz of water for 10 minutes.

The roots of wild asparagus (*Asparagus racemosus*), also known as shatavari, have been widely recommended in the Ayurvedic tradition to increase milk production in lactating women. The herb is considered to be a nourishing herb and is also recommended for those who are debilitated or convalescing. Nursing mothers often consume a combination of wild asparagus root and cardamom called Shatavari Kalpa. There are a handful of animal and human studies that support the lactogenic effect of wild asparagus, given either alone or in combination

with other herbs³⁸; however, a randomized controlled study of *A racemosus* in women with lactational inadequacy failed to find any effect on milk production or prolactin levels.³⁹ The dose is 1 g powdered root per day taken in milk or juice.

The lactagogue effect of goat's rue (*Galega officinalis*) leaf was first scientifically reported to the French Academy in 1873 after observing that it increased milk production in cows by 35% to 50%. These findings were later independently confirmed in 1913.⁴⁰ There are no modern studies for review. Goat's rue is found in numerous products, typically in combination with other herbs. The tea is generally prepared by steeping 1 teaspoon of dried leaves in 8 oz of water for 10 minutes, with 1 cup taken 2 or 3 times a day. One adverse event in the literature links the maternal ingestion of a lactation tea containing extracts of licorice (*Glycyrrhiza glabra*), fennel (*Foeniculum vulgare*), anise (*Pimpinella anisum*), and goat's rue with drowsiness, hypotonia, lethargy, emesis, and poor suckling in 2 breastfed neonates. An evaluation for infection yielded negative results, and symptoms and signs resolved after discontinuation of the tea and a 2-day break from breastfeeding.⁴¹ The tea was not tested for contaminants or adulterants, and there are no other published adverse events.

Milk thistle (*Silybum marianum*), best known for its liver-protecting effects, has been used as a lactagogue for centuries. Early Christian lore holds that the white leaf veins are a symbolic representation of the Virgin Mary's breast milk, hence the common names of milk thistle and St Mary's thistle. There are no human studies evaluating its purported lactagogue effect. There are no known safety concerns with the seed. The tea is prepared by simmering 1 teaspoon crushed seeds in 8 oz of water for 10 minutes. The dose is 1 to 3 cups daily or 1 to 3 g of the ground seeds in capsule form. Note that this is not the standardized extract typically used for liver disorders but rather crude preparations of the seeds.

Aniseed, caraway seed, cinnamon, dill, and fennel seed are all aromatic spices that can easily and safely be added to the diet: dill to a tuna salad, cinnamon in applesauce, a cup of anise tea, or candied fennel after a meal. Raspberry and nettle can be easily consumed in tea. Of the herbs commonly recommended in lay literature, only comfrey and borage should be avoided as they contain pyrrolizidine alkaloids, which pass readily into breast milk and have the potential to cause severe liver damage.⁴²

CONCLUSION

Women have been the recipients, as well as the primary keepers, of botanical medicines for millennia. Women herbalists and midwives observed the effects that particular plants had on female reproduction, pregnancy, and breastfeeding, handing down their knowledge across the generations. While their expertise and wisdom can still be felt in various folk traditions, much of the wise woman knowledge was shared through oral, not written, traditions; thus, some of the finer nuances of herbal ministrations have been lost. The lack of formal herbal training programs in Western countries over the past century has contributed to our gap in knowledge. While scientific research has

exploded in the field of natural products, there has been shamefully little research aimed at assessing the safety and effectiveness of botanical remedies during pregnancy and lactation. When coupled with a marketplace filled with hundreds of products targeting women, including a considerable number with dubious efficacy and questionable quality, it becomes clear that there is a strong need for a rigorous approach for assessing which herbs are of benefit and under what circumstances. Hopefully clinicians, researchers, and herbal manufacturers can work together to conduct rigorous scientific studies, both at the basic science level and in clinical trials; create reasonable practice guidelines for the use of botanical remedies during pregnancy and lactation; and design high-quality products that are based on sound formulation, scientific principles, and clinical need.

REFERENCES

- Vickers KA, Jolly KB, Greenfield SM. Herbal medicine: women's views, knowledge and interaction with doctors: a qualitative study. *BMC Complement Altern Med*. 2006 Dec 7;6:40.
- Glover DD, Amonkar M, Rybeck BF, Tracy TS. Prescription, over-the-counter, and herbal medicine use in a rural, obstetric population. *Am J Obstet Gynecol*. 2003;188(4):1039-1045.
- Cashion C. Endocrine and metabolic disorders. In: Lowdermilk DL, Perry SE, Bobak IM, eds. *Maternity and Women's Health Care*. 7th ed. St. Louis, MO: Mosby; 2000:861-886.
- Borrelli 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(4):849-856.
- Blumenthal M, Busse W, Goldberg A, et al, eds. *The Complete German Commission E Monographs: Therapeutic Guide to Herbal Medicines*. Austin, TX: American Botanical Council; 1998.
- Weidner MS, Sigwart K. The safety of ginger extract in the rat. *J Ethnopharmacol*. 2000;73(3):513-520.
- Wilkinson JM. Effect of ginger tea on the fetal development of Sprague-Dawley rats. *Reprod Toxicol*. 2000;14(6):507-512.
- Portnoi G, Chng LA, 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(5):1374-1377.
- Atanackovic G, Navioz Y, Moretti ME, Koren G. The safety of higher than standard dose of doxylamine-pyridoxine (Diclectin) for nausea and vomiting of pregnancy. *J Clin Pharmacol*. 2001;41(8):842-845.
- Fugh-Berman A. Acupressure for nausea and vomiting of pregnancy. *Alt Ther Women's Health*. 1999;1(2):9-16.
- Patterson TF, Andriole VT. Bacteriuria in pregnancy. *Infect Dis Clin North Am*. 1987;1(4):807-822.
- Lucas MJ, Cunningham FG. Urinary infection in pregnancy. *Clin Obstet Gynecol*. 1993;36(4):855-868.
- US Preventive Services Task Force. *Guide to Clinical Preventive Services: Report of the U.S. Preventive Services Task Force*. 2d ed. Baltimore, MD: Lippincott Williams & Wilkins; 1996.
- Jepson RG, Craig JC. Cranberries for preventing urinary tract infections. *Cochrane Database Syst Rev*. 2008 Jan 23;(1):CD001321.
- Jepson RG, Craig JC. A systematic review of the evidence for cranberries and blueberries in UTI prevention. *Mol Nutr Food Res*. 2007;51(6):738-745.
- European Scientific Cooperative on Phytotherapy Monographs on the Medicinal Uses of Plant Drugs. Fascicule 5. Exeter, United Kingdom: ESCOP, 1997.
- Larsson B, Jonasson A, Fianu S. Prophylactic effect of UVA E in women with recurrent cystitis: A preliminary report. *Curr Ther Res Clin Exp*. 1993;53(4):441-443.
- McGuffin M, Hobbs C, Upton R, Goldberg A. *American Herbal Products Association's Botanical Safety Handbook*. Boca Raton, FL: CRC Press; 1998.
- Smith MT, Zhang L, Jeng M, et al. Hydroquinone, a benzene metabolite, increases the level of aneuploidy of chromosomes 7 and 8 in human CD34-positive blood progenitor cells. *Carcinogenesis*. 2000;21(8):1485-1490.
- McFarlin BL, Gibson MH, O'Rear J, Harman P. A national survey of herbal preparation use by nurse-midwives for labor stimulation. Review of the literature and recommendations for practice. *J Nurse-Midwifery*. 1999;44(3):205-216.
- Gunn TR, Wright IM. The use of black and blue cohosh in labour. *N Z Med J*. 1996;109(1032):410-411.
- Jones TK, Lawson BM. Profound neonatal congestive heart failure caused by maternal consumption of blue cohosh herbal medication. *J Pediatr*. 1998;132(3 Pt 1):550-552.
- Finkel RS, Zarlengo KM. Blue cohosh and perinatal stroke. *N Engl J Med*. 2004;351(3):302-303.
- de Smet PA, Hansel R, Keller K. *Adverse Effects of Herbal Drugs*. Berlin, Germany: Springer Verlag; 1993:348.
- Scott C, Chin K. The pharmacologic action of N-methylcytisine. *Therapeutics*. 1943;79:334.
- Kennelly EJ, Flynn TJ, Mazzola EP, et al. Detecting potential teratogenic alkaloids from blue cohosh rhizomes using an in vitro rat embryo culture. *J Nat Prod*. 1999;62(10):1385-1389.
- Betz JM, Andrzejewski D, Troy A, et al. Gas chromatographic determination of toxic quinolizidine alkaloids in blue cohosh *Caulophyllum thalictroides* (L.) Michx. *Phytochem Anal*. 1998;9(5):232-236.
- Liske E, Gerhard I, Wustenberg P. Menopause: herbal combination product for psychovegetative complaints. *TW Gynakol*. 1997;10:172-175.
- Bradley PR. *British Herbal Compendium: Volume 1: A Handbook of Scientific Information on Widely Used Plant Drugs*. Dorset, UK: British Herbal Medicine Association; 1992.
- Parsons M, Simpson M, Ponton T. Raspberry leaf and its effect on labour: safety and efficacy. *Aust Coll Midwives Inc J*. 1999;12(3):20-25.
- Simpson M, Parsons M, Greenwood J, Wade K. Raspberry leaf in pregnancy: its safety and efficacy in labor. *J Midwifery Womens Health*. 2001;46(2):51-59.
- Wagner CL, Anderson DM, Pittard WB 3rd. Special properties of human milk. *Clin Pediatr (Phila)*. 1996;35(6):283-293.
- Lucas A, Cole TJ. Breast milk and neonatal necrotizing enterocolitis. *Lancet*. 1990;336(8730):1519-1523.
- Wright AL, Bauer M, Naylor A, Sutcliffe E, Clark L. Increasing breastfeeding rates to reduce infant illness at the community level. *Pediatrics*. 1998;101(5):837-844.
- Huggins KE. *Fenugreek: One Remedy for Low Milk Production*. Available at: <http://www.breastfeedingonline.com/fenuhugg.shtml>. Accessed December 2, 2008.
- Swafford S, Berens P. Effect of fenugreek on breast milk volume. Abstract presented at: 5th International Meeting of the Academy of Breastfeeding Medicine; September 11-13, 2000, Tucson, Arizona.
- Co MM, Hernandez EA, Co BG. A comparative study on the efficacy of the different galactagogues among mothers with lactational insufficiency. Abstract presented at: AAP Section on Breastfeeding, 2002 NCE; October 21, 2002.
- Goyal RK, Singh J, Lai H. Asparagus racemosus—an update. *Indian J Med Sci*. 2003;57(9):408-414.
- Sharma S, Ramji S, Kumari S, Bapna JS. Randomized controlled trial of Asparagus racemosus (Shatavari) as a lactagogue in lactational inadequacy. *Indian Pediatr*. 1996;33(8):675-677.
- Remington JP, ed. *The Dispensatory of the United States of America*. 20th ed. Philadelphia, PA: Lippincott-Raven; 1918.
- Rosti L, Nardini A, Bettinelli ME, Rosti D. Toxic effects of a herbal tea mixture in two newborns. *Acta Paediatr*. 1994;83(6):683.
- Panter KE, James LF. Natural plant toxicants in milk: a review. *J Anim Sci*. 1990;68(3):892-904.