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Herbs and Pregnancy

By Anthony R. Scialli, MD and Adriane Fugh-Berman, MD

THERE IS NO EVIDENCE THAT THE USE OF CULINARY HERBS SUCH AS garlic or ginger is harmful during pregnancy, but the growing popularity of medicinal herbs may increase the deliberate or inadvertent use of medicinal herbs during pregnancy, raising the possibility of adverse fetal or neonatal effects.

Prevalence

It is unknown how often medicinal herbs are used during pregnancy. A small study in South Africa of 229 patients in labor found that 55% had taken herbs during pregnancy.[1] Herbal use during pregnancy was associated with a higher rate of meconium staining (55.6% compared to 15% in the control group) and cesarean section (38.5% compared to 22% in the control group).

A survey of 172 certified nurse-midwives (CNMs) found that 90 CNMs prescribed or encouraged use of labor-stimulating herbs.[2]

Echinacea (*E. purpurea, E. angustifolia, E. pallida*)

The effect of echinacea use during pregnancy was investigated by Motherisk, a Toronto information center that handles telephone calls from women with concerns about pregnancy exposures. Pregnancy outcome was obtained for 206 women who took this herb, 112 of whom used it during the first trimester.[3] A control group consisted of 206 women who called Motherisk with questions about echinacea but who did not take it, or who took an antibiotic for upper respiratory infection. The antibiotics were judged by the Motherisk team to have posed no increased risk of birth defects.

Pregnancy outcome information was collected using a questionnaire that was completed by the women. There were 195 live births among women with echinacea exposure, with elective and spontaneous abortion accounting for the remainder of the subjects. There were six children with major congenital malformations in the echinacea-exposed group, including one case each of inguinal hernia, bilateral hydronephrosis, syndactyly, duplication of the renal pelvis, laryngotracheomalacia, and trisomy 18. There were seven children with major congenital malformations in the control group. The rates of major malformations were not different between the groups and

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were not different from the 3-5% rate that would be expected in the general population.

The major strength of this study is the prospective enrollment of women based on exposure, prior to the women's awareness of pregnancy outcome. This prospective enrollment avoids the inclusion of more exposed women with abnormal outcomes than of women with normal outcomes. Weaknesses include the possibility that this population was self-selected by having been aware of the availability of Motherisk counseling, and by their interest in seeking counseling. (An unpublished survey of the Organization of Teratology Information Services suggests that women calling these services are predominantly white, middle-class, college-educated, and English-speaking.) Another weakness is the ascertainment of outcome by maternal report. Although maternal report of major birth defects can be expected to be reliable, misreporting of abnormalities that are subtle, difficult to understand, or still under clinical investigation is possible.

The study suggested that "gestational use of echinacea during organogenesis is not associated with a detectable increased risk for major malformations." This conclusion is limited by the ability of a sample of this size to identify an important risk of malformations. The authors' analysis indicated 80% power to detect a 3.5-fold increase in the rate of major malformations. In other words, if the background risk of major malformations in the population is 3-5%, echinacea exposure would have to give rise to a 10-18% incidence of major malformations to have been detected in a sample of this size. There are medications (including thalidomide and isotretinoin) that produce malformation rates at this level or higher, but most medication exposures that increase the risk of birth defects do so at a considerably lower level (1% or 2%). It would be reasonable to conclude, then, that echinacea is not another thalidomide, but it would be premature to recommend use of this herb during pregnancy based on this study.

St. John's Wort (*Hypericum perforatum)*

St. John's wort is commonly used to treat depression. A report of two women who took St. John's wort during pregnancy noted no untoward events.[4]

A recent study tested the effects of prenatal exposure to St. John's wort on long-term growth in physical maturation of mouse offspring.[5] Forty-eight CD-1 mice were randomized to 180 mg/kg/d hypericum or placebo for two weeks before conception and throughout gestation. There were no differences between groups in physical milestones, reproductive capability, perinatal outcomes, or growth and development of first- or second-generation offspring.

Ginseng (*Panax ginseng*, other *Panax* species)

Ginseng is an adaptogenic, tonic herb commonly used in Chinese medicine; it also has become popular in the West. A letter to the editor presented 88 women who reported using ginseng during pregnancy.[6] There was no apparent increase in adverse pregnancy outcome compared to unexposed women. In another study, ginseng was tested in rats over two generations and caused no adverse effects on reproductive performance including fetal development.[7]

Blue Cohosh (*Caulophyllum thalictroides*) and Black Cohosh (*Cimicifuga racemosa*)

Blue cohosh is used for labor facilitation. The McFarlin survey of CNMs found that 64% of those who prescribed herbs for labor facilitation used blue cohosh and 45% used black cohosh.[2] Twenty-one percent of the CNMs reported complications when herbs were used, including nausea, meconium-stained fluid, and transient fetal tachycardia with use of blue and black cohosh.

Maternal use of blue cohosh in high doses for one month prior to birth was associated with acute anterolateral myocardial infarction and congestive heart failure in an infant.[8] Severe hypoxic-ischemic symptoms were

Alternative Therapies in Women's Health, ISSN 1522-3396, is published monthly by American Health Consultants, 3525 Piedmont Rd., NE, Bldg. 6, Suite 400, Atlanta, GA 30305.

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GST Registration Number: R128870672.
Periodical rate postage pending at Atlanta, GA.
POSTMASTER: Send address changes to ***Alternative Therapies in Women's Health***, P.O. Box 740059, Atlanta, GA 30374.

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United States
$279 per year (Student/Resident rate: $110).
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$309 per year plus GST (Student/Resident rate: $125 plus GST).

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In order to reveal any potential bias in this publication, and in accordance with Accreditation Council for Continuing Education guidelines, physicians have reported the following relationships with companies related to the field of study covered by this CME program. Dr. Cates, Dr. Fugh-Berman, Dr. Greenwood, Dr. Kronenberg, Dr. McPartland, and Dr. Massion have reported no relationships with companies related to the field of study covered by this CME program. Dr. Awang has the following relationships: consultant for Leiner Health Products, and Global Botanical/Health 4 All. Dr. Low Dog is a consultant for the Materia Medica Group. Dr. Pan is a researcher for Chitosan. Dr. Scialli has the following relationships: consultant for TAP and Merck; speaker for TAP; researcher for TAP, Wyeth-Ayerst, and Balance Pharma.

seen in the baby of a woman who took a mixture of blue cohosh and black cohosh (*Cimicifuga racemosa*) to induce labor.[9] Blue cohosh rhizomes contain caulosaponin and caulophyllosaponin, both saponins with vasoconstrictor activity and cardiotoxic effects.[10] Blue cohosh also contains anagyrine in concentrations of up to 290 ppm.[11] Anagyrine in lupine (*Lupinus* species) causes crooked calf disease in the offspring of cows who graze on it.[12] Anagyrine is thought to require metabolism by rumen microflora to exhibit teratogenic effects, so it may not have the same effects in humans. One case, however, suggests a link between maternal consumption of anagyrine-containing goat milk and vascular anomaly, skeletal dysplasia, and malformed red blood cells in an infant.[13]

Tripterygium wilfordii

Also called thunder god vine, *Tripterygium wilfordii* is a Chinese herb used to treat rheumatoid arthritis and dermatological conditions. Occipital meningoencephalocele and cerebellar agenesis were associated with the use of *Tripterygium wilfordii* early in pregnancy; the herb was being used for the treatment of arthritis.[14] *Tripterygium wilfordii* caused open neural tube defects and other embryotoxic effects in an in vitro whole mouse embryo culture system.[15]

Eleuthero or Siberian Ginseng (*Eleutherococcus senticosis*)

Eleuthero is an adaptogenic or tonic herb. Neonatal hirsutism in a baby noted to have hair on the forehead, pubic hair, swollen nipples, and enlarged testes was attributed to the use of Siberian ginseng (*Eleutherococcus senticosis*) throughout pregnancy and during lactation. However, the wrong herb was blamed; subsequent analysis showed that the herb consumed was actually Chinese silk vine (*Periploca sepium*).[16] *E. senticosis* also was tested in castrated rats for androgenic effects; daily oral administration of 1.5 g/kg (equivalent to 105 g given to a 70 kg human) of *E. senticosis* for a week

Assessing Pregnancy Risk

By Anthony R. Scialli, MD

THE ASSESSMENT OF PREGNANCY RISK IS MADE USING TWO general kinds of information. The most appealing kind of information is follow-up data on pregnancies in women exposed to the agent of interest. There are important problems with this kind of information. First, there may not be many pregnancy exposures, resulting in inadequate power to identify an increased risk of an adverse outcome. The incidence of congenital malformations among newborns is 3-5%. Identifying an exposure that increases that incidence by 0.5% would require follow-up on hundreds of exposed pregnancies.

Exposures known to increase the incidence of birth defects in humans affect relatively few structures. For example, valproic acid, an anticonvulsant, increases the incidence of spina bifida from about 0.1% to about 1%.[1] The first assessment of valproic acid effects in pregnancy included 12 exposed pregnancies, all of which resulted in normal babies.[2] Of course, the problem is that too few exposures were evaluated. Even in collections of cases with several dozen exposed pregnancies, normal outcomes, while reassuring, do not prove safety.

The second potential problem with follow-up studies lies in the quality of the assessment of the child. Trained dysmorphologists find more birth defects than do general pediatricians, and pediatricians find more birth defects than do obstetricians, who may restrict their examination of the baby to counting fingers and toes. Birth certificates, which usually are completed by obstetricians, who are notoriously inaccurate in identifying children with birth defects. Some birth defects also are more likely to be diagnosed as children get older and some maybe diagnosed with different levels of completeness depending on the access of the child to diagnostic equipment such as echocardiography.

The other kind of information used in assessing pregnancy risk comes from experimental animal studies. Pregnant animals, usually rats and rabbits, but sometimes mice, hamsters, guinea pigs, or other species, are given high doses of the compound of interest. A high dose is used to bring out a tendency of the compound to produce abnormal development. It is common, however, for a high dose of any compound to produce illness in the mother animal. When embryo development or survival is impaired under these conditions, it may be difficult to tell if the abnormality was due to a direct effect of the test compound on the embryo, or due to maternal illness. Teratologists have criteria by which they evaluate these possibilities. For example, if the test compound is given at three different doses, the incidence or severity of the abnormality in the embryos would be expected to increase as the dose is increased. Although the presence of abnormal outcome in experimental animal studies may not give rise to a clear estimate of risk to human pregnancy, the lack of adverse pregnancy outcome when animals are given high doses of test compounds generally is reassuring.

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caused no androgenic effects and no overt toxic effects.[17]

Licorice (*Glycyrrhiza glabra*)

Besides flavoring candy, licorice commonly is used in both Western and Chinese herbal medicine. A study of 1,049 Finnish women, however, found that heavy intake of licorice candy during pregnancy significantly increased the odds ratio (OR) for birth prior to 38 weeks gestation (OR 2.5, 95% confidence interval 1.1, 5.5, P = 0.03).[18] There was no effect on gestational age.

In a rat teratology study, an herbal combination of nine agents, one of which was licorice root, did not increase congenital anomalies and appeared to protect against valproic acid-induced defects.[19]

Ginger (*Zingiber officinale*)

Although useful for morning sickness, ginger traditionally has been used for "suppressed menses," a term that is sometimes a euphemism for early pregnancy. An abortifacient effect, however, has not been shown in humans. In a clinical trial of nausea and vomiting of pregnancy, one patient experienced a spontaneous abortion; another underwent induced abortion for non-medical reasons.[20] Twenty-five patients went to term and all infants born were normal in terms of appearance, birthweight, and Apgar scores.

Raspberry Leaf (*Rubus idaeus*)

Raspberry leaf preparations commonly are used as pregnancy tonics. No adverse effects of raspberry leaf preparations have been reported. An Australian retrospective record review of 57 women who had consumed raspberry leaf products during their pregnancy and 51 controls (randomly selected from hospital records of women who stated they had not consumed raspberry leaf products) found no safety problems for women or their babies when raspberry leaf products were consumed during pregnancy.[21] *(See* Alternative Therapies in Women's Health, *April 2001, pp. 25-26.)*

Conclusion

Blue cohosh has been associated with several cases of adverse neonatal outcomes. *Tripterygium wilfordii* has been associated with a single case of occipital meningoencephalocele and cerebellar agenesis; however, an animal study demonstrating open neural tube defects supports causality. There is no evidence to date that use of St. John's wort, echinacea, ginseng, eleuthero, or raspberry leaf during pregnancy is harmful.

As is true for therapeutics in nonpregnant women, medications, including herbal therapies, should not be used unless there is adequate evidence of safety and efficacy. Midwives and herbalists who care for pregnant women should use an evidence-based approach and should recognize that almost all effective medicines can have problematic side effects. ❖

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Stevia rebaudiana

By Adriane Fugh-Berman, MD and Anthony R. Scialli, MD

STEVIA (*STEVIA REBAUDIANA* BERTONI) IS A SMALL SHRUB native to high altitude regions of Brazil and Paraguay. The leaves are sweet, due to the presence of stevioside and other glycosides (mainly rebaudiosides A and C). Dried stevia leaves contain 6-8% stevioside, which has little caloric value and is 300 times sweeter than sucrose at 0.4%.[1] The sweet taste of stevia is stable to heat and yeast fermentation. Stevioside does not increase the risk of dental caries.

Stevia extracts and stevioside have been used as food additives in Japan for more than 20 years. Stevia and its extracts are not approved as food additives in the United States but are available in North America as dietary supplements. Two or three leaves are used to sweeten a beverage, or 2 tablespoons can be substituted for 1 cup of sugar. The limited popularity of stevia may be partly due to its somewhat bitter and metallic aftertaste.

Hypertension

A randomized, double-blind, placebo-controlled study in 106 Chinese hypertensive men and women (100 completed) tested stevioside (250 mg tid) for one year.[2] Subjects, who were not receiving other antihypertensive medications, were assessed monthly. After three months, both systolic and diastolic blood pressure in the treated group decreased significantly, an effect that persisted throughout the year. No changes were seen in lipid levels and no significant adverse effects were observed.

In spontaneously hypertensive rats, intravenous stevioside (50, 100, and 200 mg/kg) had a dose-related hypotensive effect on both systolic and diastolic blood pressure; the highest dose had an effect that lasted longer than an hour.[3]

Effects on Glucose

Although claims have been made that stevia reduces glucose levels in humans, the only evidence that supports this effect is a small clinical trial reported as a letter to the *Brazilian Journal of Medical and Biological Research* in 1986. Sixteen healthy adults underwent a glucose tolerance test (GTT) before and after receiving 13 doses of an aqueous extract of stevia; each dose was made from 5 g of dry leaves and doses were apparently administered six hours apart.[4] Six controls received arabinose (250 mg) over the same schedule (arabinose was used as a control because large amounts of arabinose are found in stevia). Mean plasma glucose levels after stevia ingestion were reported to be significantly lower at 30, 60, 90, 120, 150, and 180 minutes compared to baseline GTT. Controls experienced no change from baseline.

However, the Chan study found that stevioside caused no changes in glucose levels in 100 subjects who were treated for a year.[2] And in animals, feeding studies found no changes in glucose levels in rats consuming 0.5-1.0 g stevia extract or stevioside as 7% of the diet for 56 days; intravenous stevioside transiently lowers glucose levels in alloxan-treated diabetic rabbits.[1]

Animal Toxicity

In rats, the LD_{50} of intraperitoneally administered stevia extract (containing 50% stevioside) is 3.4 g/kg; the oral LD_{50} of stevioside in rats is reportedly 8.2 g/kg.[1] High doses of orally administered stevioside (2.0 g/kg) are acutely toxic in mice. Up to 7% stevioside fed to rats for three months produced no remarkable toxic effects. Another study found that up to 3% dietary stevioside caused no changes in mating, fertility problems, or teratogenic effects in male or female rats.[1]

In hamsters, stevioside in doses up to 2.5 g/kg body weight (BW)/d did not affect growth or reproduction.[5]

A daily dose of a stevia decoction purportedly has been used as an oral contraceptive by Paraguayan Matto Grosso Indian tribes,[6] but this claim is controversial.[1] Stevia may reduce fertility in both sexes. A water decoction of stevia reduced fertility in adult female rats (calculated as a percentage of rats that became pregnant) by 57-90%; fertility still was reduced by half two months after ingestion of the decoction ceased.[6] This 1968 report was limited by a lack of details on important aspects of the study. For example, a very high concentration of stevia was used and no information was given on the clinical status (including feed intake and weight changes) in treated animals. Generalized toxicity or poor feed intake could have profoundly decreased fertility. A

subsequent study in mice was said to have produced similar effects, but we have not been able to review the original manuscript of this study.[7]

In contrast, several Japanese studies cited in an extensive review found no effects on fertility.[1] In one of these studies, three doses of stevioside were given to groups of 10 female rats for 21 days prior to mating (after which stevioside-free rations were given). Pregnancy rates were 80% in controls, 60% in rats fed 0.28% stevioside, 80% in those receiving 1.4%, and 70% in those fed 7.0% stevioside. In another study, up to 3% dietary stevioside did not affect mating performance or fertility, nor were teratogenic effects noted.[1]

Twenty male Wistar rats were given an aqueous extract of stevia (66.7 g dried leaves/100 ml bid) for 60 days. There was a significant decrease in concentration of spermatozoa in the cauda epididymis and the weights of cauda epididymis, seminal vesicles, and testes decreased.[8] There was a significant decrease in plasma testosterone levels but not in luteinizing hormone levels. Stevia did not cause any significant change in food consumption, body weight, or blood glucose levels.

Stevioside and another component in stevia, rebaudioside A, are degraded to the more toxic steviol by rat cecal flora; it is unclear whether this property is shared by humans.[1] In pregnant hamsters, steviol in doses up to 0.25 g/kgBW/d had no observable effect. Very high doses of steviol (750 and 1,000 mg/kgBW/d) were highly toxic to both dams and fetuses.[9] This dose caused maternal death and weight loss, with a reduction in number of live fetuses and mean fetal weight as would be expected in the face of this degree of maternal toxicity. An intermediate but still large dose of 500 mg/kgBW/d produced a more modest decrease in maternal weight gain and small decrease in mean fetal weight, also an expected association. No effects were observed at 250 mg/kgBW/d.

Conclusion

Stevia, an herbal sweetener sold as a dietary supplement, has been used as a food additive in Japan for more than 20 years. Although small amounts of stevia in foods and beverages are not harmful, potential reproductive effects of long-term use of large quantities have been identified in experimental rodent studies. These worrisome reproductive effects have prevented stevia from being adopted more widely as an artificial sweetener. ❖

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CME Questions

6. The Chinese herb *Tripterygium wilfordii*, taken during pregnancy, has been associated with:
a. limb defects.
b. open neural tube defects.
c. spontaneous abortion.

7. Heavy licorice intake during pregnancy has been linked to:
a. birth prior to 38 weeks gestation.
b. low birth weight.
c. neural tube defects.

8. A case of neonatal hirsutism was traced to maternal use of:
a. Eleuthero or Siberian ginseng (*Eleutherococcus senticosis*).
b. Chinese silk vine (*Periploca sepium*).

9. Safety concerns about the sweetener stevia center around:
a. nephrotoxic effects.
b. hepatotoxic effects.
c. reproductive effects.

10. A recent study of perineal massage during labor found that the treated group:
a. had fewer first- and second-degree tears than the control group.
b. had no difference in first- and second-degree tears compared to the control group.

Perineal Massage in Labor

Source: Stamp G, et al. Perineal massage in labor and prevention of perineal trauma: Randomised controlled trial. *BMJ* 2001; 322:1277-1280.

Design/Setting/Subjects: One thousand three hundred forty English-speaking women, carrying singleton pregnancies, who were receiving prenatal care at one of three tertiary hospitals in Australia. Women were enrolled at their 36-week prenatal visits, and were stratified by nulliparity or multiparity.

Treatment: Perineal massage during the second stage of labor. Perineal massage was performed by a midwife, who lubricated her fingers with water-soluble lubricant, inserted two fingers inside the vagina and used a sweeping motion to stretch the perineum.

Results: There were no differences in rates of intact perineum between the treatment group and control group among either nulliparous or multiparous women. There were no differences between groups in number of episiotomies or first- and second-degree tears. Third-degree tears were less common in the massage group (12) compared to the control group (23) (Relative risk 0.47, 95% confidence interval, 0.23-0.93, P = 0.04). One fourth-degree tear occurred in the control group and none in the massage group. There were no differences between groups in terms of pain at three days, 10 days, or three months or in dyspareunia at three months postpartum. There was no difference between groups in urinary or bowel urgency or incontinence. Birth outcomes and infant outcomes were similar between groups.

Funding: Research and Development Grants Advisory Committee of the Commonwealth Department of Health Housing and Community Services (now National Health and Medical Research Council) and the Australian College of Midwives. Johnson and Johnson provided lubricant.

Comments: Perineal massage during labor was not impressive in this study, but the significant reduction of third-degree tears is intriguing and should be followed up with a larger study. It is unfortunate that stratification was not also done by age, as that has made a difference in a previous study of prenatal perineal massage. Starting six weeks before the estimated due date, 861 nulliparous women with singleton pregnancies performed perineal massage (3-4 times/wk for four minutes).[1] Women younger than 30 years experienced no reduction in tears or instrument deliveries, but women older than 30 years experienced a significant reduction in both tears and instrument deliveries.

Another randomized controlled trial of 1,034 women without a previous vaginal birth and 493 women with more than one previous vaginal birth tested the effect of perineal massage (5-10 min/d) starting at 35-34 weeks gestation.[2] Perineal massage did not affect third- and fourth-degree perineal lacerations, but there was a significantly higher rate of intact perineum among women without a previous vaginal birth (24.3% in the massage group vs. 15.1% in the control group). Three months after delivery, there were no differences between the massage and control groups in perineal pain; dyspareunia; sexual satisfaction; or incontinence of urine, gas, or stool among women with a previous vaginal birth.[3] Significantly more women assigned to massage (93.6%) vs. controls (85.8%) were free of perineal pain at three months.

Perineal massage is clearly safe, and the prenatal version may benefit nulliparous women, especially those who are older than age 30. Perineal massage during labor may reduce third-degree tears but does not increase the chances of maintaining an intact perineum. ❖

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Aromatherapy and Abortion

Source: Wiebe E. A randomized trial of aromatherapy to reduce anxiety before abortion. *Eff Clin Pract* 2000;4:166-169.

Design/Setting/Subjects: Double-blind, randomized trial of 66 women awaiting surgical abortion at a freestanding abortion clinic in Vancouver, British Columbia.

Treatment: After routine counseling, subjects spent 10 minutes sniffing a container of placebo (a hair conditioner containing Brazil nut oil) or a mixture of essential oils recommended for relaxation (3 drops vetivert [*Vetiveria zizanoides*], six drops of bergamot [*Citrus bergamia = Citrus aurantium* subsp. Bergamia], and four drops of geranium [*Pelargonium graveolens*] in cold-pressed soy oil).

Outcome Measures: Anxiety level was assessed before and after treatment by asking participants to rate their level of anxiety on a verbal anxiety scale of 1-10.

Results: Anxiety scores were reduced by 1 point (from 5 to 4) in the aromatherapy group and by 1.1 points (from 6.1-5) in the placebo group. There was no significant difference between groups.

Funding: Not stated (the Tzu Chi Institute for Complementary and Alternative Medicine is listed among acknowledgements, and Aroma Borealis is acknowledged for providing aromatherapy supplies).

Comments: There are very few controlled studies of aromatherapy; and even fewer involving inhalation of essential oils. Several aromatherapy trials have tested the adjunctive effect of aromatherapy oils to massage (comparing massages done with unscented oils to massages done with essential oil-enhanced oils). Some "aromatherapy" trials have tested essential oils taken internally, a mode of administration I argue is herbal medicine, not aromatherapy.

This was a simple trial, with a nicely chosen control, that showed no effect of aromatherapy on anxiety before a minor surgical procedure. It would have been preferable, however, to use a standard, validated instrument for measuring anxiety. Also, the statistical analysis is inappropriate; the authors should have determined what degree of change on the scale represented improvement and then counted what proportion of each group could be characterized as improved. ❖

Echinacea purpurea and Herpes

Source: Vonau B, et al. Does the extract of the plant *Echinacea purpurea* influence the clinical course of recurrent genital herpes? *Int J STD AIDS* 2001;12:154-158.

Design/Setting/Subjects: A double-blind, placebo-controlled crossover trial of 50 patients (24 men and 26 women) with a minimum of four genital herpes recurrences in the previous year or prior to suppressive acyclovir. The median number of recurrences prior to trial entry was seven (4-25) over a one-year period. Of the 50 patients, 71.4% of were serology-positive for HSV-1 and HSV-2; 20.4% serology-positive for HSV-2; and 8.2% were serology-positive for HSV-1 (with positive genital cultures).

Treatment: *Echinacea purpurea* extract (Echinaforce, containing 95% plant extract and 5% root extract) 800 mg bid or placebo for six months, after which subjects were crossed over to the other arm.

Results: There were no statistically significant differences in frequency or duration of herpes recurrences, pain scores, or CD4, CD8, or neutrophil counts. Only 31 patients completed the trial. One patient who received echinacea experienced severe diarrhea and withdrew after two months. Eight withdrawals were for unknown reasons, two because of pregnancy or desire for pregnancy, four for time restrictions, four for adverse events (mainly diarrhea), and one (on echinacea) for depression. Nausea was reported by four patients on echinacea and two on placebo.

Funding: Not stated. Bioforce (manufacturer of Echinaforce) provided study drug, placebo, and scientific support.

Comments: Echinacea has not proven to be an effective prophylactic for viral infections—first colds, now genital herpes. A Cochrane review found echinacea extracts unimpressive for preventing colds.[1] Neither of the methodologically acceptable prevention trials found that echinacea decreased incidence of colds, shortened duration of illness, or decreased infection severity.[2,3] A recent double-blind prophylaxis trial (not included in the above review) randomized 109 patients with recurrent colds or upper respiratory infections (URI) to 4 ml fluid extract of *E. purpurea* or placebo for eight weeks.[4] Sixty-five percent (35/54) of the echinacea group and 74% (40/54) of placebo group had at least one cold or URI; there was no significant difference between groups in incidence, duration, or severity of colds and respiratory infections. Echinacea has immunomodulatory properties in vitro and in vivo, but it may be more effective as a treatment than as a prophylactic, possibly because it may lose its immunostimulating effects over time. There is no reliable evidence to date that supports its prophylactic use against viruses. ❖

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In Future Issues:

Massage and Low Back Pain

Stress and Birth Defects

Calcium and Pregnancy