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Garlic

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CASRN: 8008-99-9

Drug Levels and Effects

Summary of Use during Lactation

Garlic (*Allium sativum*) contains alliin, which is metabolized by the enzyme alliinase to allicin, thought to be responsible for most of garlic's medicinal properties and odor. Garlic's odor in milk is attributed to allyl methyl sulfide.[1] Garlic has been used to lower cholesterol and blood pressure. It has no specific indications for use during lactation in western countries. Garlic has been used as a galactogogue in India and Turkey,[2-5] although no good scientific data could be located on its use alone as a galactogogue. Galactogogues should never replace evaluation and counseling on modifiable factors that affect milk production.[6,7] Garlic has a long history of use as a food and medicine and is "generally recognized as safe" (GRAS) as a food flavoring by the U.S. Food and Drug Administration, including during lactation.[8] Garlic's odor is transmitted to breastmilk, which may increase infant sucking time acutely and might enhance the breastfed infant's food choices in the long term. Some mothers in Turkey reportedly use garlic to improve the taste and quality of their milk.[4] Limited scientific data found that a few days of oral garlic supplementation caused no adverse effects in nursing mothers or infants. When used as a medicinal, garlic is generally well tolerated in adults, but gastrointestinal side effects and bad breath and body odor may occur. Garlic has anti-platelet effects and should be used cautiously by women at risk for bleeding. Garlic can cause allergies and should be avoided by persons allergic to garlic or other members of the lily family, such as hyacinth, tulip, onion, leek, and chives. Topical application of garlic can cause dermatitis and burns and should be used with caution, especially in infants. One nursing mother received severe burns to the breast from prolonged (2 days) application of a poultice of raw, crushed garlic to treat a self-diagnosed Candida infection.[9]

Dietary supplements do not require extensive pre-marketing approval from the U.S. Food and Drug Administration. Manufacturers are responsible to ensure the safety, but do not need to *prove* the safety and effectiveness of dietary supplements before they are marketed. Dietary supplements may contain multiple ingredients, and differences are often found between labeled and actual ingredients or their amounts. A manufacturer may contract with an independent organization to verify the quality of a product or its ingredients, but that does *not* certify the safety or effectiveness of a product. Because of the above issues, clinical

testing results on one product may not be applicable to other products. More detailed information about dietary supplements is available elsewhere on the LactMed Web site.

Drug Levels

Maternal Levels. Mothers given placebo or 1.5 g of garlic (General Nutrition Center, Pittsburgh, PA) in capsules once daily extracted about 20 mL of breastmilk every hour for 4 hours after garlic ingestion. A panel of 11 men and women who were blinded to maternal product ingestion rated the perceived odor of garlic in each sample. Garlic odor was most strongly perceived at 2 hours after maternal garlic ingestion. The odor remained equally perceptible at 3 hours after ingestion in some mothers' milk.[10]

Six nursing mothers 22 to 51 weeks postpartum each ate 3 grams of raw garlic and donated 3 milk samples via breast pump, 1 before ingesting the garlic and 2 afterwards at 2 to 3 hour intervals. Garlic-derived metabolites were measured over a period of up to 5.2 hours after the ingestion of garlic. A panel of sensory evaluators identified odors present in milk samples and several known metabolites were detected in the milk by high-resolution gas chromatography-olfactometry. The panelists identified a garlic or cabbage-like odor in breast milk about 2.5 hours after maternal consumption of garlic. Out of 13 possible garlic-derived metabolites, laboratory analyses found only allyl methyl sulfide, allyl methyl sulfoxide, and allyl methyl sulfone in breastmilk. Only allyl methyl sulfide had a garlic-like odor; the other two metabolites were odorless. Measured levels of the metabolites had peak concentrations between 2 and 3 hours after maternal garlic ingestion.[11]

Twelve nursing mothers who were 9 to 41 weeks (mean 22 weeks) postpartum donated 18 sets of breastmilk samples after consuming 3 grams of fresh, raw garlic. Each set contained 1 milk sample before ingesting garlic and 3 samples afterwards at 2- to 4-hour intervals. A slight garlic or cabbage odor of was detected at low levels in all post-ingestion milk samples by a trained panel of odor analysts. The odor was thought to be that of allyl methyl sulfide, a garlic metabolite. Additionally, allyl methyl sulfide, allyl methyl sulfoxide, and allyl methyl sulfone were analyzed in all milk samples. Peak concentrations of allyl methyl sulfide ranged from 0.6 to 4 mcg/kg human milk; peak allyl methyl sulfoxide ranged from 30 to 145 mcg/kg human milk; and peak allyl methyl sulfone ranged from 49 to 200 mcg/kg human milk. Most peak times occurred between 1 and 3.5 hours after garlic ingestion, although the peak occurred at about 5 hours post-ingestion in a few samples.[12]

Three women donated milk samples after ingesting roasted garlic and three donated milk samples after ingesting cooked (boiled) garlic. Milk samples were obtained before and at 3 times after the ingestion of garlic, at approximately 2, 4 and 6 hours after ingesting the garlic. Allyl methyl sulfide was determined to be the odorific component of milk after the ingestion of roasted garlic and appeared between 1 to 3 hours after ingestion, although it was also detected in a second peak at 5 to 7 hours after ingestion in some samples. No odoriferous components were detected after ingestion of cooked garlic. Chemical analysis also found allyl methyl sulfoxide and allyl methyl sulfone peak levels from 1 to 4 hours after ingestion of roasted and cooked garlic, although levels were lower after cooked garlic.[1]

Infant Levels. Relevant published information was not found as of the revision date.

Effects in Breastfed Infants

Maternal garlic ingestion has a reputation for causing colic in breastfed infants. Two papers tend to refute this claim. In one, 153 mothers who answered a questionnaire were no more likely to report colic in their infants in the previous week if they had ingested garlic than if they had not.[13]

In another study, mothers who were given either 1.5 grams of garlic or placebo capsules once daily in a blinded fashion for 3 days were asked if their infants had exhibited any signs of colic (were fussier, cried more or had more gas) after capsule ingestion. Four of 20 women who ingested garlic thought their infants had colic;

however, 4 of 10 women who received placebo thought they had received garlic and reported colic in their infants.[14]

Effects on Lactation and Breastmilk

Forty women who complained of an insufficient milk supply at 5 days postpartum were given a combination herbal supplement as 2 capsules of Lactare (Pharma Private Ltd., Madras, India) 3 times daily. Each capsule contained wild asparagus 200 mg, ashwagandha (Withania somnifera) 100 mg, fenugreek 50 mg, licorice 50 mg, and garlic 20 mg. By day 4 of therapy, no infants required supplementary feeding. Infants were weighed before and after each feeding on the fifth day of maternal therapy to determine the amount of milk ingested. On the day of the test weighing, infants' milk intake averaged 388 mL, and the fluid and caloric intake was considered adequate.[15] This study cannot be considered as valid evidence of a galactogogue effect of these herbs because it lacks randomization, blinding, a placebo control, and maternal instruction in breastfeeding technique. Additionally, infants were breastfed only 6 to 8 times daily, which is insufficient to maximize milk supply.

In two studies conducted by the same investigators, capsules containing 1.5 g of garlic extract (General Nutrition Center, Pittsburgh, PA) were given to nursing mothers. In the first experiment, 8 mothers receive a garlic capsule or placebo once daily in a crossover fashion. Garlic-naive infants whose mothers ingested garlic capsules spent more time (33 vs 27 minutes) attached to the nipple during the time period of 1.5 to 3 hours after garlic ingestion when garlic odor in milk was maximal than in those whose mothers received a placebo; however, total number of nursings or total amount of milk ingestion did not differ between groups.[6] A study randomized nursing mothers to receive garlic capsules or placebo for 3 days before testing with a single capsule as in the study above. Infants who received garlic in the milk for the first time spent 30% more time nursing than after placebo. Infants who had been previously exposed to garlic in milk, did not spend more time nursing after subsequent garlic exposure in milk.[14] The authors interpreted the results of these studies as having a positive effect on infants' later food choices (i.e., being less "picky" about foods).[16]

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Substance Identification

Substance Name

Garlic

Scientific Name

Allium sativum

CAS Registry Number

8008-99-9

Drug Class

Breast Feeding

Lactation

Milk, Human

Complementary Therapies

Food

Galactogogues

Phytotherapy

Plants, Medicinal