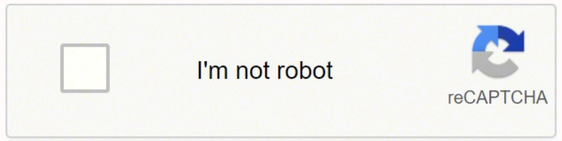

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Is iodine safe while breastfeeding

Iodine is an essential trace nutrient for all infants that a normal component of breastmilk. Infant requirements are estimated to be 15 mcg/kg daily in fullterm infants and 30 mcg/kg daily in preterm infants.[1] A breastmilk iodine concentration of 100 to 200 mcg/L is considered to reflect adequate iodine status in lactating women.[2] Systematic reviews and studies on iodine nutrition found that iodine in breastmilk is adequate in iodine-sufficient countries, but in countries with iodine fortification of foods, many mothers did not obtain adequate iodine and that additional supplementation was desirable.[3-7] In iodine-deficient areas, supplementation of breastfeeding mothers with iodine appears to be more effective than direct supplementation of the infant in reducing infant iodine deficiency.[8] In the United States, a total iodine intake of 290 mcg daily is recommended during lactation; the WHO recommends a total intake of 250 mcg daily.[6] The American Thyroid Association recommends that breastfeeding women should supplement their diet with a daily oral supplement that contains 150 mcg of iodine, but sustained iodine intake while breastfeeding that exceeds 500 to 1100 mcg daily should be avoided.[9] A survey in the United States between 2011 and 2014 found that only 19% of lactating women used a dietary supplement that contained iodine.[10] One study found improved neurodevelopment is the infants of mothers who received 150 mcg of iodine daily during breastfeeding, but a dose of 300 mcg daily did not improve the outcome.[11]The use of excessive amounts of iodine in the mother near term and during breastfeeding (e.g., seaweed soup) can increase breastmilk iodine levels and cause transient hypothyroidism in breastfed infants. Supplementing mothers with Grave disease in appropriate doses potassium iodide usually does not adversely affect their breastfed infants, although a few may develop mild hypothyroidism.[12,13] The absorption of iodine can be marked after application to open wounds or mucous membranes. Exposure of mothers to unnecessary iodine who are or will be breastfeeding should be avoided or minimized to the extent possible by avoiding its use on maternal mucous membranes (e.g., vaginal use, wound therapy), avoiding prolonged contact time, avoiding repeated applications, and applying it to the smallest possible surface areas of the body. It is possible that maternal exposure to iodine near term could interfere with thyroid studies done as a part of newborn screening tests.Iodine is a normal mineral in breastmilk that is essential for the infant's thyroid. Iodine concentrations are highest in colostrum, declining gradually as lactation progresses. The amounts of iodine in breastmilk vary with maternal iodine intake and possibly with genetic variants in the NaI symporter.[14] The WHO recommends that lactating women have urinary iodine levels of 100 mcg/L. Others have suggested a breastmilk iodine reference range between 60 and 450 mcg/kg.[6]Maternal Levels. A study of 97 iodine-sufficient women in Switzerland compared two analytic methods. The ICP-MS standard curve method found a median iodine concentration of 245 mcg/kg in pooled milk samples from 25 women while the ICP-MS 129-I isotope ratio method found a median concentration of 183 mcg/kg in pooled milk samples of 66 women.[15]A study of 36 breastmilk samples from 18 different states in 2003-04 found a mean iodide breastmilk concentrations of 63.3 mcg/L (range 4.5 to 162 mcg/L).[16] Another study of 108 breastmilk samples from 10 women by the same authors found a mean iodide concentration of 87.9 mcg/L (range 3.1-334 mcg/L), and a median concentration of 55.2 mcg/L.[17] The reason for the differences in iodine values between these two studies and the above studies is not clear.Two women were given potassium iodide orally. One was given 325 mg orally 3 times daily to a total of 3.6 grams and the other was given 650 mg orally 3 times daily to a total of 4.6 grams. Milk samples were obtained after the eighth and eleventh doses in the first woman and 2 hours after the last dose in the second woman. The first woman had milk iodide concentrations of about 33 and 29 mg/L and the second had a concentration of about 38 mg/L.[18] The analytic method used in this old study was insensitive and imprecise by modern standards.A woman developed an abdominal wall abscess 1 week after having a cesarean section. The abscess was treated with systemic antibiotics and the wound was packed with 60 sq. cm of iodine tampons, containing about 10.5 mg of iodine. On day 29 postpartum, her milk iodine was 4410 mcg/L (normal range 29 to 490 mcg/L). Her iodine therapy was stopped, and 2 days later milk iodine was about 1400 mcg/L; by day 40 postpartum, it was about 1000 mcg/L. By day 60 postpartum, the milk level was below 100 mcg/L.[19]The mother of a 31-week preterm infant packed her cesarean section wound with iodine-soaked gauze because of wound dehiscence and infection. Her breastmilk iodine concentration at 3 weeks postpartum was 1911 mcg/L (upper limit of normal 185 mcg/L).[20]The mothers of 31 preterm Korean infants was measured for iodine concentration on week 1, 3 and 6 postpartum. Korean mothers have elevated iodine levels from large amounts of dietary iodine in brown seaweed soup during the first month postpartum. Median breastmilk iodine levels were 2529, 1153 and 822 mcg/L at the 3 times, respectively.[21]A mother used an iodine antiseptic on her episiotomy wound for 10 to 12 days postpartum. At 15 days postpartum, her milk iodine level was 300 mcg/L (normal 100-200 mcg/L).[22]A mother ate large amounts of seaweed soup imported from China for the first 10 days postpartum to increase her breastmilk supply. Breastmilk iodine levels were much higher during the time of seaweed consumption at 878 mcg/L total iodine compared to 188 mcg/L 4 weeks later and 144 mcg/L 7 weeks later.[23]A study in northern Spain compared the milk iodide level of mothers taking a normal diet, including iodized salt and seafood (n = 14), with mothers on the same diet plus a supplement of 200 mg daily of potassium iodide (n = 46). The median breastmilk iodide levels from supplemented mothers of preterm infants was 0.172 mg/L in the supplemented mothers compared to 0.128 mg/L in the unsupplemented mothers. The median breastmilk iodide levels from supplemented mothers of fullterm infants was 0.178 mg/L in the supplemented mothers compared to 0.117 mg/L in the unsupplemented mothers. No statistical difference was found between preterm and fullterm milk iodide in either the supplemented or unsupplemented group. The authors conclude that in this iodine-sufficient area, unsupplemented mothers excrete sufficient amounts of iodide in breastmilk.[24]Sixteen lactating women were administered 752 mcg of potassium iodide (572 mcg iodine) in the morning after an overnight fast. They also ingested an additional 36 to 685 mcg of dietary iodine during the study period. Breastmilk samples were obtained at baseline and every hour for 8 hours. Breastmilk iodide increased from an average of 46 mcg/L at baseline to a peak of 354 mcg/L. Peak iodine levels in milk occurred at an median of 6 hours (range 5 to 7 hours) after the dose of iodine.[25]A study in Thailand compared mothers supplemented with 200 mcg daily of iodine daily to unsupplemented mothers. Breast milk samples were collected from 57 lactating women, 33 of whom received iodine supplementation during pregnancy. The median breastmilk iodine concentration at 2 months postpartum was significantly higher in the supplemented mothers (109 mcg/L) than in unsupplemented mothers 70 mcg/L).[26]A study in Iran, which is considered iodine deficient, compared iodine breastmilk content between control mothers and those supplemented with cow's milk fortified with 150 mcg of iodine per cup. Both groups used iodized salt. Iodine levels in breastmilk were greater in the supplemented group than in the control group at 10, 14 and 30 days, with the median levels ranging from 210 to 242 mcg/L compared to the control group which had median levels ranging from 142 to 162 mcg/L at the same times.[27]A study in Ethiopia compared administration of capsules containing 225 mcg of iodine given once daily to the provision of iodized salt containing 35 mcg/gram of iodine to mothers who were breastfeeding. At the end of 6 months no difference was found in median breastmilk iodine concentrations between the two groups. Forty-five percent of women had breastmilk iodine levels above 120 mcg/L, which is the level recommended for adequate infant iodine intake. The authors considered the two methods to be equivalent.[28]Twenty-three mothers in Japan were treated with potassium iodide for Graves disease. Doses were adjusted to maintain normal thyroid function; the median dose was 50 mg daily (range 10 to 100 mg/day). The median breastmilk iodine level was 15.05 mg/L (range 0.831 to 72 mg/L).[12]Thirty-six women in the Netherlands took a supplement containing 150 mcg of iodine daily during pregnancy and for 4 weeks postpartum. Milk samples from 33 of the women analyzed at 4 weeks postpartum contained 1.2 micromoles/L (304 mcg/L; range 0.05 to 3 micromoles/L).[29]A study in Iran randomized mothers to receive placebo (n = 51), 150 mcg (n = 50) or 300 mcg (n = 43) of iodine daily as potassium iodate for 12 months. Milk iodine levels were measured at 1, 2, 4, 6, and 12 months postpartum. In mothers who received iodine, median breastmilk iodine over the 12-month period was greater than in the placebo group. The iodine concentration was 1.39 times higher in the 300 mcg group than that in the 150 mcg group. Iodine milk levels slowly trended downward and at 12 months postpartum, levels in all groups was about 150 mcg/L.[4]Fifty-seven women in Iceland had foremilk iodine levels measured at 5.5 months postpartum. The median breastmilk iodine content was 84 mcg/L (IQR: 48 to 114 mcg/L).[30]A study in China compared lactating women from four cities, two with an average drinking water iodine of 57.5 mcg/L and two with an average of 464.8 mcg/L. Median milk iodine levels in the milk of women was 312 mcg/L from the low iodine cities and 1006 mcg/L from the high iodine cities. Living in the high-iodine area for more than 5 years was a strong predictor of breastmilk iodine sufficiency or excess.[31]Mothers in Tianjen, China, where iodized salt is consumed, had breastmilk iodine levels measured at 1, 4, 8, 12, 16 and 24 weeks postpartum. At 1 week postpartum, 634 mothers participated and their mean maternal breastmilk iodine was 365 mcg/L (median 225 mcg/L). By 24 weeks postpartum, 151 mothers participated and breastmilk iodine levels had steadily decreased to a mean of 80 mcg/L (median 121 mcg/L). The authors judged these values to be adequate for infant nutrition.[32]A study in New Zealand compared the breastmilk iodine concentrations of women taking an iodine supplement (n = 35) to those who were not (n = 52). Mothers who took an iodine supplement had a median milk iodine level of 84 mcg/L and those who took no supplement had a median milk iodine level of 62 mcg/L.[7]Infant Levels. The preterm infants of Korean mothers with high levels of breastmilk iodine had relative high urinary iodine levels that were thought to be related to high maternal intake of iodine.[21]A woman developed an abdominal wall abscess 1 week after having a cesarean section. The abscess was treated with systemic antibiotics and the wound was packed with 60 sq. cm of iodine tampons, containing about 10.5 mg of iodine. On day 29 postpartum, her breastfed infant's urine contained 3932 mcg/L of iodine (normal range

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