U.S. National Library of Medicine
National Center for Biotechnology Information

NLM Citation: Drugs and Lactation Database (LactMed) [Internet]. Bethesda (MD): National Library of Medicine (US); 2006-. Metoprolol. [Updated 2018 Oct 31].
Bookshelf URL: https://www.ncbi.nlm.nih.gov/books/

Metoprolol

Revised: October 31, 2018.

CASRN: 37350-58-6

Drug Levels and Effects

Summary of Use during Lactation

Because of the low levels of metoprolol in breastmilk, amounts ingested by the infant are small and would not be expected to cause any adverse effects in breastfed infants. Studies on the use of metoprolol during breastfeeding have found no adverse reactions in breastfed infants. No special precautions are required.

Drug Levels

The excretion of beta-adrenergic blocking drugs into breastmilk is largely determined by their protein binding. Those with low binding are more extensively excreted into breastmilk.[1] Accumulation of the drugs in the infant is related to the fraction excreted in urine. With 10% protein binding, 40% renal excretion and a moderate half-life, metoprolol presents moderately low risk for accumulation in infants.

Maternal Levels. With metoprolol doses of 50 mg orally twice daily, milk levels are usually less than 420 mcg/L.[2][3][4] Five women taking oral metoprolol 100 to 200 mg daily had average milk metoprolol levels of 316 mcg/L.[5] It is estimated that a breastfed infant would receive a dose of about 0.07 mg/kg daily in breastmilk with a maternal dose of 200 mg daily.[4]

Peak milk levels of 106 to 689 mcg/L have been reported following doses of 100 mg orally twice daily.[4][6] Peak milk levels occurred about 30 minutes after peak serum levels, at 1.5 hours after the dose in two patients, and 6 hours after the dose in a third.[6]

Two women who were taking metoprolol (dosage not specified). Milk samples were obtained over one dosage interval. The dosage of metoprolol and alpha-hydroxymetoprolol in breastmilk was less than 2% of the mother's weight-adjusted dose.[7]

Three mothers who took metoprolol in unspecified dosages during breastfeeding had breastmilk samples collected every 2 to 3 hours over one dosage interval. The average amount of metoprolol excreted in breast milk was 71.5 mcg/day (range 17.0 to 158.7). The average relative infant dosage was 0.5% of the mother's weight-adjusted dosage. Renal clearance of metoprolol was increased during lactation at 3 to 4 months postpartum, possibly related to increased maternal prolactin.[8]

Infant Levels. Metoprolol was undetectable (<2.7 mcg/L) in the plasma of 3 infants aged 4, 10 and 60 days after maternal oral doses of 100 mg daily.[2]

Metoprolol serum levels in 3- to 5-day-old breastfed infants ranged from 0.5 to 2.9 mcg/L after maternal doses of 50 or 100 mg twice daily.[3][9]

A woman was taking metoprolol 100 mg daily for hypertension during pregnancy and postpartum. Her breastfed infant's serum concentrations of metoprolol and its active metabolite, alpha-hydroxymetoprolol, were undetectable on days 4 and 182 postpartum.[10]

Effects in Breastfed Infants

A study of mothers taking beta-blockers during nursing found a numerically, but not statistically significant increased number of adverse reactions in those taking any beta-blocker. Although the ages of infants were matched to control infants, the ages of the affected infants were not stated. Of 6 mothers taking metoprolol, none reported adverse effects in her breastfed infant.[11][12]

Effects on Lactation and Breastmilk

Relevant published information on the effects of beta-blockade or metoprolol during normal lactation was not found as of the revision date. A study in 6 patients with hyperprolactinemia and galactorrhea found no changes in serum prolactin levels following beta-adrenergic blockade with propranolol.[13]

Alternate Drugs to Consider

Propranolol, Labetalol

References

1. Riant P, Urien S, Albengres E et al. High plasma protein binding as a parameter in the selection of betablockers for lactating women. Biochem Pharmacol. 1986;35:4579-81. PubMed PMID: 2878668.
2. Kulas J, Lunell NO, Rosing U et al. Atenolol and metoprolol. A comparison of their excretion into human breast milk. Acta Obstet Gynecol Scand Suppl. 1984;Suppl 118:65-9. PubMed PMID: 4043203.
3. Lindeberg S, Sandstrom B, Lundborg P et al. Disposition of the adrenergic blocker metoprolol in the late-pregnant woman, the amniotic fluid, the cord blood and the neonate. Acta Obstet Gynecol Scand Suppl. 1984;Suppl 118:61-4. PubMed PMID: 6587729.
4. Sandstrom B, Regardh CG. Metoprolol excretion into breast milk. Br J Clin Pharmacol. 1980;9:518-9. PubMed PMID: 7397065.
5. Sandstrom B. Antihypertensive treatment with the adrenergic beta-receptor blocker metoprolol during pregnancy. Gynecol Invest. 1978;9:195-204. PubMed PMID: 750326.
6. Liedholm H, Melander A, Bitzen PO et al. Accumulation of atenolol and metoprolol in human breast milk. Eur J Clin Pharmacol. 1981;20:229-31. PubMed PMID: 7286041.
7. Yep T, Eyal S, Easterling TR et al. The pharmacokinetics of metoprolol during pregnancy. Pharmacotherapy. 2011;31:439e. Abstract. DOI: 10.1592/phco.31.10.311e.
8. Ryu RJ, Eyal S, Easterling TR et al. Pharmacokinetics of metoprolol during pregnancy and lactation. J Clin Pharmacol. 2016;56:581-9. PubMed PMID: 26461463.
9. Sandstrom B, Lindeberg S, Lundborg P et al. Disposition of the adrenergic blocker metoprolol in the late pregnant woman, the amniotic fluid, the cord blood and the neonate. Clin Exp Hypertens B. 1983;2:75-82. PubMed PMID: 6135523.
10. Grundmann M, Kacirova I, Duricova J, Perinova I. Metoprolol and alfa-hydroxymetoprolol concentrations during lactation - a case report. Ther Drug Monit. 2011;33:504. Abstract. DOI: 10.1097/01.ftd.0000400651.94145.ba.

11. Ho TK, Moretti ME, Schaeffer JK et al. Maternal beta-blocker usage and breast feeding in the neonate. Pediatr Res. 1999;45:67A. Abstract 385.
12. Schimmel MS, Eidelman AI, Wilschanski MA et al. Toxic effects of atenolol consumed during breast feeding. J Pediatr. 1989;114:476-8. PubMed PMID: 2921694.
13. Board JA, Fierro RJ, Wasserman AJ et al. Effects of alpha- and beta-adrenergic blocking agents on serum prolactin levels in women with hyperprolactinemia and galactorrhea. Am J Obstet Gynecol. 1977;127:285-7. PubMed PMID: 556882.

Substance Identification

Substance Name

Metoprolol

CAS Registry Number

37350-58-6

Drug Class

Breast Feeding

Lactation

Antihypertensive Agents

Adrenergic Beta-Antagonists

Antiarrhythmics