



Diphtheria-Tetanus-Pertussis Vaccines

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Drug Levels and Effects

Summary of Use during Lactation

The Centers for Disease Control and Prevention and several health professional organizations state that vaccines given to a nursing mother do not affect the safety of breastfeeding for mothers or infants and that breastfeeding is not a contraindication to tetanus, diphtheria, and pertussis (Tdap) vaccine.[1-3] Women are recommended to receive Tdap with every pregnancy, which decreases the infant's risks of hospitalization and ICU admission, and results in shorter hospital stays than in infants whose mothers were not vaccinated. Anti-pertussis antibodies in human milk may contribute to the protection provided to the infant against pertussis infection.[4,5] Women vaccinated after 20 weeks of gestation have higher antipertussis IgA and IgG levels in their breastmilk than those who are not vaccinated. Women, including nursing mothers, who have not received acellular pertussis vaccine with Tdap previously should be vaccinated with Tdap immediately postpartum.[4,6] After vaccination, antipertussis antibodies appear in breastmilk within 1 to 2 weeks and persist for at least 6 months. Conflicting results have been reported on whether breastfed infants are protected from pertussis.[7,8] Breastfeeding appears to reduce infant side effects associated with routine childhood immunization. Breastfed infants should be vaccinated according to the routine recommended schedules.

Drug Levels

Maternal Levels. Thirty-nine women who were within 24 hours postpartum received 0.5 mL of Tdap vaccine (Adacel, Sanofi Pasteur) and 11 received no vaccine. Colostrum or breast milk and blood samples were collected at baseline and 7, 10, 14, and 28 days after vaccination. Breastmilk IgA levels against pertussis toxin peaked at day 10 postpartum, then slowly decreased. Breast milk antibody levels against the other antipertussis vaccine components, filamentous hemagglutinin and fimbriae types 2 and 3, reached a plateau during days 10 to 14 and then slowly decreased. Breast milk antibody levels against another antipertussis vaccine component, pertactin, peaked on day 14 and then decreased by day 28.[9]

The milk of 25 pregnant women given Tdap vaccine (Boostrix, GlaxoSmithKline) after 20 weeks of pregnancy was compared to colostrum from 12 unvaccinated women. Milk samples were collected prior to discharge after delivery (colostrum) and at 2, 4 and 8 weeks postpartum. Vaccinated women had significantly higher

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antipertussis antibody levels in their breastmilk than unvaccinated women. The primary class of immunoglobulins was IgA, which were highest in colostrum, but still detectable at 8 weeks.[10]

Total and anti-pertussis toxin secretory IgA (sIgA) levels were measured in breastmilk from women who had been vaccinated either during pregnancy (n = 19), at or shortly after delivery (n = 34), less than 5 years before delivery (n = 9), or more than 5 years before delivery (n = 12). Tdap vaccine (Boostrix, GlaxoSmithKline) was used in the first 3 groups. Breastmilk samples were obtained between 44 and 91 days postpartum. No difference in total sIgA was found between the groups, but women who were vaccinated during pregnancy or shortly after birth had higher anti-pertussis toxin levels of sIgA than those vaccinated more than 5 years before. Higher anti-pertussis toxin sIgA levels were found among women practicing mixed feeding than among exclusively breastfeeding mothers.[11]

A study compared breastmilk antibody levels in mothers who were or were not vaccinated with Tdap (Boostrix, GSK) at 24 to 32 weeks of pregnancy. Results were also separated into those who delivered at term and those who delivered preterm. Blood and milk samples were collected in the first 72 hours postpartum, then at 4, 8 and 12 weeks postpartum. After preterm delivery, breastmilk contained antipertussis IgA and IgG levels comparable to those after term delivery. Milk after preterm delivery contained colostrum antipertussis IgA of 5.39 IU/mL compared with 6.69 IU/mL in mothers who delivered at term. Maternal vaccination during pregnancy induced higher antipertussis IgG levels in colostrum of vaccinated than in unvaccinated women delivering at term (0.110 IU/mL vs 0.027 IU/mL). Some women who were not vaccinated during pregnancy were vaccinated postpartum. In those women, antibody levels at 4 weeks postpartum were equal to those of women vaccinated during pregnancy. Antipertussis antibodies persisted until at least 12 weeks postpartum.[12]

A study measured IgG levels against several antigens (tetanus and diphtheria toxoids, *B. pertussis* toxin, filamentous hemagglutinin, pertactin, and fimbriae) in 15 women in the US who were given Tdap during pregnancy and 26 women in Malawi who were given only tetanus vaccination during pregnancy. Women living in the US had higher antibody levels than those in mothers living in Malawi for all antigens tested except for tetanus. The study also followed women given Tdap (Adacel) at various times postpartum. Vaccine-specific IgG and IgA were detected in breast milk from 18 women at 2 weeks, 31 women at 6 weeks, and 19 women at 6 months after vaccination. The highest antibody concentrations were detected 2 weeks post-vaccination (the first time point tested). Antibodies in breastmilk decreased 1.5 months after vaccination and even further at 6 months. For all antigens, breast milk IgG and IgA concentrations 6 months post-vaccination were significantly lower than those at 2 weeks post-vaccination. IgG titers in breastmilk were lower than those measured in serum, but there was a strong correlation between peak IgG titers in both compartments.[13]

Infant Levels. A study of 338 children in Greenland between 7.1 and 12.1 years old found the median concentrations of tetanus and diphtheria antibodies to be 0.92 and 0.07 IU/mL. Most (72%) of children had been breastfed at least 6 months, and only 7 children (2%) were never breastfed. Forty-two (12%) had tetanus concentrations below the protective limit and 175 (52%) had diphtheria concentrations below the limit. Exposure to marine environmental contaminants such as mercury, PCBs and perfluoro compounds were associated with markedly reduced odds of having diphtheria antibodies above the protective level.[14]

Effects in Breastfed Infants

Breastfeeding can enhance the response of the infant to certain vaccine antigens,[1,2,15] including tetanus toxoid and pertussis.[16,17] Breastfed infants are also less likely to have fever and may be less likely to experience anorexia and reduced energy intake after routine childhood immunization than those who are not breastfed.[18,19]

A study in the United States of mothers who did not receive Tdap vaccine during pregnancy found that their infants who received breastmilk with 1 formula feeding or fewer daily decreased pertussis risk by about 75% compared with infants receiving more formula.[17]

One study of previously vaccinated infants found that at 21 to 40 months of age breastfed infants had higher IgG levels against diphtheria, higher secretory IgA levels in saliva against diphtheria and tetanus and higher fecal IgM against tetanus than formula-fed infants.[20]

A case-control study in Brazil found that exclusive breastfeeding of infants under 6 months of age protected them against pertussis-like illness. Protection was enhanced if the mother had been vaccinated against pertussis during pregnancy.[21]

Effects on Lactation and Breastmilk

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

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Substance Identification

Substance Name

Diphtheria-Tetanus-Pertussis Vaccines

Drug Class

Breast Feeding

Lactation

Milk, Human

Vaccines