

Influence of vitamin D supplementation on a baby's gut microbiome

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New research from the CHILD Cohort Study has shed light on the influence of vitamin D supplementation on a baby's developing gut microbiome.

The study, published in the journal *Gut Microbes*, found that vitamin D

supplementation is associated with compositional changes in a baby's microbiome—notably a lower abundance of the bacteria *Megamonas*—at three months of age.

"Vitamin D plays an important role in [early life](#), supporting bone metabolism and the healthy development of a baby's [immune system](#)," said senior author Anita Kozyrskyj, a professor in the Department of Pediatrics at the University of Alberta and a CHILD Cohort Study investigator. "Most infants in North America receive vitamin D, either as a supplement to breastfeeding or as an ingredient in commercial infant formulas, so we wanted to understand the association between vitamin D and the presence or abundance of key bacteria within a baby's intestinal tract."

The researchers examined fecal samples taken during home visits from 1,157 infants who are part of the CHILD Cohort Study—a national study that is following nearly 3,500 Canadian children from before birth to adolescence with the primary goal of discovering the root causes of allergies, asthma, obesity and other [chronic diseases](#).

They found that direct vitamin D supplementation of infants with vitamin D drops was associated with a lower abundance of *Megamonas*, regardless of how a baby was fed (breastfed or formula fed). "While little is known about *Megamonas* in infancy, our previous research suggests there may be a link between this bacterium and asthma or respiratory viral infections, so vitamin D may offer additional benefits for childhood health that should be studied further," added Kozyrskyj, also a member of the Women and Children's Health Research Institute.

The researchers also assessed the association between infant and maternal vitamin D supplementation and the presence of *Clostridioides difficile* (*C. difficile*) in a baby's gut. "Some infants carry the diarrhea-causing bacterium *C. difficile* in their guts without any symptoms.

However, when the levels of gut bacteria become imbalanced, this particular bacterium can multiply, causing illness and increasing the susceptibility to chronic disease later in childhood," commented first author Kelsea Drall, an MSc graduate from the U of A and an AllerGen trainee.

The study found that nearly 30 percent of the infants carried *C. difficile*, but there was a lower incidence of the bacterium among exclusively breastfed infants. However, neither infant supplementation with vitamin D drops nor maternal vitamin D supplementation during pregnancy or after delivery was associated with *C. difficile* colonization.

"Interestingly, maternal consumption of vitamin D-fortified milk was the only factor that reduced the likelihood of *C. difficile* colonization in infants," added Drall.

According to Kozyrskyj, an infant's gut microbiota undergoes rapid change in early life. Therefore, it is critical to understand the factors associated with microbial communities populating the infant gut during this key developmental period.

"Low [vitamin D](#) levels have been associated with respiratory syncytial virus (RSV)—a common lung infection among [infants](#)—and more recently, susceptibility to COVID-19 disease," she pointed out. "In the CHILD Cohort Study, we have a unique opportunity to follow our study children as they get older to understand how microbial changes observed as a result of dietary interventions may be associated with later health outcomes such as asthma and viral infections."

More information: Kelsea M. Drall et al, Vitamin D supplementation in pregnancy and early infancy in relation to gut microbiota composition and *C. difficile* colonization: implications for viral respiratory infections, *Gut Microbes* (2020). [DOI: 10.1080/19490976.2020.1799734](https://doi.org/10.1080/19490976.2020.1799734)

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