

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 infant 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 Dr. Anita Kozyrskyj, a CHILD Cohort Study investigator and a professor in the Department of Pediatrics at the University of Alberta. “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 Dr. Kozyrskyj.

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 M.Sc. graduate from the University of Alberta and an AllerGen trainee.

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

According to Dr. 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.”

About the CHILD Cohort Study:

Launched in 2008 by CIHR and AllerGen NCE, the [CHILD Cohort Study \(CHILD\)](#) is tracking nearly 3,500 Canadian infants and their families to help determine the root causes of chronic diseases such as asthma, allergies and obesity. CHILD spans four provinces, involving over 140 multidisciplinary researchers, students and research staff. [Watch the CHILD Cohort Study videos.](#)

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