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BREASTMILK MICROBIOTA AND THE RISK OF CHILDHOOD ATOPY AND ASTHMA: A PROSPECTIVE BIRTH COHORT STUDY

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Background:

Breastfeeding protects against pediatric asthma. However, the role of milk microbiota in asthma development is unclear.

Objective:

We investigated the association of breast milk microbiota with the risk of atopy and asthma development at the age of 1, 3, and 5 years.

Methods:

We analysed milk bacteria (N=877) and fungi (N=271) in the CHILD study by Illumina 16S rRNA sequencing. Atopy (1 and 3 years) and asthma (3 and 5 years) were diagnosed by healthcare professionals. Associations of milk microbiota richness with the outcomes were assessed by ANOVA stratified by infant genetic risk score (GRS) for asthma. Mediating role of the gut microbiota was assessed by structural equation modelling. Association of the relative abundances of taxa with the outcomes were assessed using ANOVA, logistic regression, and LASSO.

Results:

Milk microbiota richness was significantly lower in the milk consumed by infants who developed atopy by the age of 1 year (mean z normalised observed ASVs: -0.17 ± 0.90 vs. 0.04 ± 1.02 , $p=0.021$). When stratified based on GRS, milk microbiota richness was significantly lower in cases who developed atopy at 1 or 3 years only when the GRS was low or intermediate. Association of milk microbiota richness with atopy was independent of mediating role of the infant gut microbiota. Overall, higher relative abundances of *Streptococcaceae* and *Veillonellaceae* and lower relative abundances of *Moraxellaceae* and *Enterobacteriaceae* were associated with reduced risk of asthma at 3 years. *Bifidobacteriaceae* was significantly protective against atopy at 3y while controlling for the relative abundance of infant gut *Bifidobacteriaceae* at 3 months. Using LASSO, several taxa were identified to be associated with different atopic outcomes. Relative abundances of the identified taxa could predict development of outcomes with relatively good accuracy.

Conclusion:

Our findings suggest that milk bacteria may influence pediatric atopy and asthma. This is a topic of further investigation in the CHILD Study.