

Abstract

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Human milk bioactive compounds and allergic and infectious immunological outcomes: A systematic review

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The impact of Human Milk (HM) bioactive compounds and microbiota on infant health is crucial yet complex. Current research highlights their role in immune system development and disease prevention⁽¹⁻⁶⁾. This review aims to synthesize existing literature on the role of HM's bioactive compounds in the onset of diagnosed allergies, immunological diseases, and responses to infectious diseases in infants, along with related biomarkers.

The systematic review adhered to Synthesis without Meta-Analysis (SWiM), focusing on clinically defined allergies and immunological conditions, and responses to infectious diseases by infants and children up to 18 years. Studies analyzing HM microbiota and bioactive compounds of mothers in mother-infant pairs have been included. A comprehensive search strategy was employed across PubMed, Web of Science, SCOPUS, Scientific Electronic Library Online (SciELO), Cochrane Library, Latin American and Caribbean Health Sciences Literature (LILACS), and LIVIVO. Quality assessment utilized Joanna Briggs Institute checklists for various study designs.

The systematic review encompassed 32 studies ranging from 1983 to 2023, representing a total of 7,888 mother-infant dyads focusing on HM bioactive compounds and microbiota's impact on clinically defined immunological conditions in infants. More than 90% of the literature had been conducted in upper-middle- and high-income countries. In low- and middle-income countries, including Gambia, Bangladesh, and Nicaragua, only 3 studies were conducted. We identified that allergic and autoimmune conditions, investigated in 25 articles, particularly food allergy, sensitization, and atopic dermatitis, were inversely associated with HM linolenic and linoleic acid. Furthermore, infectious and immunological conditions, primarily diarrhea and Group B Streptococcus (GBS) infections, investigated in 7 studies, revealed significant inverse associations with human milk oligosaccharides (HMOs) (2'-fucosyllactose (2'-FL), lacto-N-difucohexaose I (LDFH-I)) and immunoglobulins (Anti-GBS secretory immunoglobulin A (SIgA), Anti-lipopolysaccharide immunoglobulin A (Anti-LPS IgA), Anti-cholera toxin immunoglobulin A (Anti-cholera toxin IgA)), respectively. Upper and lower respiratory tract infections, otitis media, and dental caries were inversely associated with galectins and galectin-3, lacto-N-tetraose (LNT), 2'-FL, and *Haemophilus influenzae*, suggesting potential protective effects of HM bioactive compounds.

Data shows that HM bioactive compounds such as polyunsaturated fatty acids (PUFAs), HMOs, and a number of specific immunoglobulin A (IgA) antibodies, might be protective for infants, possibly preventing the onset of symptoms and helping to avoid bacterial and parasitic infections, respectively. In this review, we address the increase in mechanistic knowledge about the protective effects of breastfeeding.

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