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Commentary

Biological Role of Human Milk in Infant Immune System

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DESCRIPTION

Human milk immunity refers to the protection provided to an infant immune system through biologically active components in human milk. Human milk ingredients nourish and protect the immunologically weak child. It was previously thought to exclusively provide passive immunity by Secretory IgA, however technological advances have resulted in the identification of different immune-modulating components. Cytokines, growth factors, proteins, microorganisms, and human milk oligosaccharides are immunological factors and immune-modulating components found in human milk. Breast milk contains antibodies that help the body fight infections. The first milk produced by the breasts after delivery are abundant in colostrum. Antibodies remain in breast milk till mother's nursing. It also regulates the infants own immune development and growth. Other proteins, lipids, carbohydrates, and even white blood cells are found in breast milk and help to fight with illness in a variety of ways. These are especially beneficial in the fight against gastrointestinal illnesses since breast milk travels directly to the stomach and intestine when the infant eats. The various components of breast milk work immediately within the intestine before being absorbed and reaching the rest of the body. This also helps in for a protective and balanced immune system, which aids in the recognition and combat of infections and other disorders long after breastfeeding ended. Human milk immune factors are mostly anti-inflammatory meaning they work without inducing inflammation or activating the complement system. Immunoglobulins, Lactoferrin, Lysozyme, oligosaccharides, lipids, cytokines, hormones, and growth factors are among the bioactive components of human milk that have been discovered as immune-modulating. Some of the roles of bio-actives in human milk have been hypothesised based on their activity in other regions of the body, but the processes and function of their activities are still unknown. Breast milk provides "probiotic" elements as well. Some help the immune system, while others feed good microorganisms in the body, producing the human microbiome. A healthy microbiome can play a lifetime role not just in infection prevention, but also in lowering the risk of allergies, asthma, obesity, and other chronic disorders. The most well-known immune component in human milk is immunoglobulin A. It is the most abundant antibody in human milk in its secretory form, SIgA. It accounts for 80-90% of all immunoglobulins found in milk. SIgA enhances adaptive immunity by specifically targeting pathogens to which both the infant and the mother have been exposed in their environments. Lactoferrin is an immunological protein found in human milk that has a high antimicrobial activity. Lactoferrin protects the newborn gut by preventing infections from using iron as a resource. It also affects immunity by inhibiting inflammatory signalling cytokines. Cytokines are signalling molecules that have the ability to connect to certain receptors. They have the ability to permeate the intestinal barrier and mediate immunological action. The presence of these substances in human milk may stimulate lymphocytes, which are responsible for the development of the infant's particular immunity. Human milk contains cytokines such as IL-1, IL-6, IL-8, IL-10, TNF, and IFN. The antibody composition of human milk is known to change throughout breastfeeding. Most notably, antibody levels in mature milk are lower than in colostrum, with SIgA ranging from up to 12 grams per litre in colostrum to 1 gram per litre in mature milk. According to research, the postpartum period has the greatest influence on the existence of immunological factors such as growth factors and lactoferrin. The major stimulus for immunological development in infants is exposure to microbiota through mother's milk. Microbiota interacts with the infant's immune system by activating the mucous layer, down-regulating the inflammatory response, generating antibodies and helping start oral tolerance. Mucosal layers protection derives from their capacity to stop infections from sticking to the newborn digestive tract. Except in extraordinary situations of maternal depletion, the composition of human milk remains remarkably consistent despite changes in mother diet. The concentration of immunological components is influenced by seasonal variations and hunger. Breastfeeding has been shown consistently over the last century to reduce infant mortality and morbidity, particularly from infectious disease. Comparative research comparing human milk and formula has identified that bio-active components present in human milk play important role as a potential

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immune protectors. Breastfed newborns respond better to vaccines and are more protected against diarrhoea, otitis media, sepsis, and necrotizing enterocolitis, celiac disease, obesity and inflammatory boweldisease than formula-fed infants. Human breast milk is thought to be especially useful to infants born before due date and those born underweight, who are at a higher risk of infectious disorders like sepsis and meningitis. Furthermore, breastfed has a lesser risk of contamination than mixing formula in human child.