

Immunoprotective Properties of Breastfeeding in the Care of Newborn Infants

Xurramova Gulhayo Eshniyozovna

Zarmad University

Abstract: This article scientifically analyzes the immunological significance of breastfeeding in the care of newborns. The composition of breast milk—including immunoglobulins, lysozyme, lactoferrin, interferon, and other bioactive components is examined for its protective role against infections in infants. Compared to artificial feeding, breastfeeding is shown to enhance immune system development, maintain intestinal microbiota balance, and reduce the risk of allergic diseases. The findings highlight that breast milk serves not only as a nutritional source but also as a vital component of immunobiological protection for newborns.

Keywords: Breast milk, immune system, immunoglobulin, lactoferrin, newborn care, natural feeding, immune protection.

Introduction. The neonatal period is one of the most delicate and critical stages in human life. During this time, the newborn's body comes into full contact with the external environment for the first time. Since the immune system is still immature, the infant becomes highly susceptible to various infectious agents. In such a vulnerable state, the most natural and evolutionarily developed form of protection is breastfeeding. Breast milk is not merely a source of nutrition; it is a complex biological fluid that plays a vital role in the immunological protection of the infant. Breast milk contains a rich combination of immunoglobulins (mainly IgA), lactoferrin, lysozyme, interferons, cytokines, macrophages, and lymphocytes, all of which work synergistically to strengthen the infant's natural immune defense mechanisms. In particular, secretory IgA protects the infant's intestinal mucosa against viruses and bacteria, while lactoferrin binds iron ions, inhibiting microbial growth, and lysozyme destroys bacterial cell walls, providing an effective antimicrobial barrier.

In contrast, artificial feeding lacks these immune components or provides them in minimal amounts, leading to higher risks of infectious diseases, dysbiosis, allergic reactions, and weakened immune responses in formula-fed infants. Therefore, the World Health Organization (WHO) recommends exclusive breastfeeding for the first six months of life. This practice not only supports physiological development but also strengthens immunobiological, psychological, and social health outcomes for both the infant and the mother. Through breastfeeding, the infant receives not only immune-active substances but also maternal antibodies developed throughout the mother's lifetime. This process establishes passive immunity, protecting the baby from numerous diseases for several months after birth. Moreover, the act of breastfeeding itself enhances emotional bonding and reduces stress in both mother and child — factors that indirectly support immune system stability. In summary, breastfeeding lays the foundation for healthy infant development by promoting immunological resilience, disease resistance, and long-term well-being. Modern scientific research confirms that breast milk is, in essence, a “living immune system” — a naturally engineered biological mechanism perfected through evolution.

Thus, prioritizing breastfeeding in newborn care is not only a medical necessity but also a social and biological imperative for ensuring a healthy future generation.

Main Part. Immunological significance of breast milk composition. Breast milk is a complex biological system containing more than 2,000 active components. Among them are immunoglobulins (IgA, IgG, IgM), lactoferrin, lysozyme, cytokines, oligosaccharides, prebiotics, antimicrobial peptides, and cellular elements. The most important of these is secretory IgA, which forms a protective layer on the infant's intestinal mucosa, preventing pathogenic microorganisms from adhering to and penetrating epithelial cells. Studies have shown that breastfed infants have 60–70% lower rates of intestinal infections compared to formula-fed infants (WHO, 2021).

The biological role of lactoferrin and lysozyme. Lactoferrin is an iron-binding glycoprotein that deprives pathogenic bacteria of the iron required for their growth, thereby inhibiting their proliferation. In addition, it enhances immune cell activity and strengthens anti-inflammatory defense mechanisms. Lysozyme, on the other hand, is an enzyme that breaks down bacterial cell walls, particularly effective against *Staphylococcus aureus* and *Escherichia coli*. Together, these two components maintain the stability of the intestinal microflora and support immunological balance in infants.

Oligosaccharides and microbiota balance. The human milk oligosaccharides (HMO) found in breast milk are now recognized as major immunomodulatory factors. They stimulate the growth of beneficial bacteria such as *Bifidobacterium* and *Lactobacillus*, which suppress the proliferation of pathogenic microorganisms. This process strengthens the intestinal barrier and enhances mucosal immunity. In contrast, infant formulas either lack HMOs or contain only synthetic forms, which do not provide the same immunological benefits.

Development of passive immunity through breastfeeding. Through breast milk, infants receive maternal antibodies (IgG and IgA) that were developed in response to infections the mother encountered during her lifetime. These antibodies form passive immunity, protecting the newborn against respiratory infections, diarrhea, pneumonia, and meningitis during the early months of life. Statistical data show that exclusively breastfed infants experience three times fewer cases of pneumonia and five times fewer cases of acute diarrhea compared to those fed artificially (UNICEF, 2020).

Psycho-immunological factors. Breastfeeding is not only a physiological process but also a psycho-immunological one. During breastfeeding, the mother's body releases oxytocin and prolactin, which reduce stress hormone levels, promote relaxation, and enhance immune function. For the infant, the process fosters a sense of security and emotional stability, which also positively influences immune response. Modern studies reveal that non-breastfed infants exhibit higher cortisol levels, which can weaken immune reactivity and increase susceptibility to illnesses.

Comparison with artificial feeding. Although artificial formulas contain proteins, fats, and carbohydrates, they lack biologically active immune-boosting components. The sterilization process further eliminates any beneficial bacteria that might contribute to gut and immune health. Consequently, formula-fed infants face a higher risk of bronchitis, asthma, allergies, diabetes, and obesity. According to data from Harvard Medical School (2022), exclusive breastfeeding reduces disease incidence among children under two years old by 40–60% compared to those fed with formula. Social and evolutionary importance of breastfeeding. Breastfeeding represents one of nature's most advanced and evolutionarily refined mechanisms for ensuring the survival and health of the human species. It not only provides optimal nutrition but also strengthens emotional bonding, maternal affection, and social stability. Therefore, breastfeeding is a biological, psychological, and social process that promotes individual and collective well-being. From an evolutionary perspective, it serves as a cornerstone of human health and a foundation for a healthier future generation.

Conclusion

The immune system of a newborn is highly sensitive and underdeveloped, making infants vulnerable to various infectious agents. Therefore, breastfeeding serves as the most natural, safe, and effective method of protecting the infant during this critical stage. The bioactive components of breast milk — including immunoglobulins, lactoferrin, lysozyme, cytokines, and oligosaccharides — play a crucial role in strengthening the infant's immune defense, establishing passive immunity, and maintaining intestinal microbiota balance. Scientific studies confirm that exclusively breastfed infants experience significantly lower rates of infectious and allergic diseases compared to those fed with formula, highlighting breastfeeding's role as a cornerstone of immune resilience.

Furthermore, the psycho-emotional benefits of breastfeeding are equally vital. The natural release of oxytocin and prolactin hormones fosters a strong emotional connection between mother and child, which stabilizes stress levels and enhances immune function. Thus, breastfeeding ensures not only physiological nourishment but also psychological and immunobiological harmony — essential for healthy growth and long-term well-being.

Recommendations

- Strengthen public health education programs promoting exclusive breastfeeding for at least the first six months of life.
- Organize training sessions and educational seminars for young mothers, emphasizing the immunological, psychological, and social significance of breastfeeding.
- Implement clinical evaluation systems to assess the immunological safety of artificial feeding products before they are marketed.
- Expand biomedical research focused on identifying and analyzing the immunological components of breast milk to build a stronger scientific foundation.
- Conduct public awareness campaigns through mass media to promote breastfeeding as a vital public health and societal priority.

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