
The Role of Breastfeeding in Autism Spectrum Disorder Prevention: A Minireview

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Abstract

Autism Spectrum Disorder (ASD) is a complex neurodevelopmental condition that affects millions of individuals worldwide. While the exact causes of ASD remain unclear, a growing body of research suggests that both genetic and environmental factors contribute to its development. One environmental factor that has garnered significant attention in recent years is breastfeeding. This review aims to explore the relationship between breastfeeding and ASD prevention, shedding light on the potential benefits and limitations of breastfeeding in reducing the risk of ASD.

Keywords: Autism; Breast feeding; Children; Prevention.

Introduction:

Breastfeeding has long been recognized as one of the most beneficial practices for infant health. It provides essential nutrients, strengthens the immune system, and fosters mother-infant bonding. Recent research has also explored the potential link between breastfeeding and autism spectrum disorder (ASD) prevention (1-4). In this review, we will delve into the intricate relationship between breastfeeding and ASD prevention, exploring the evidence, potential mechanisms, and implications for parents and healthcare professionals (2, 5, 6).

I. Breastfeeding: A Multifaceted Nutritional and Immunological Resource:

Breast Milk Composition:

Breast milk is a unique and highly complex fluid that provides essential nutrients, antibodies, and bioactive molecules crucial for an infant's growth and development. It contains carbohydrates, proteins, fats, vitamins, and minerals in optimal proportions, promoting healthy brain and overall organ development (7).

Immunological Benefits:

Breast milk is rich in antibodies and immune cells that bolster the infant's immune system, protecting against infections and illnesses. Reduced early-life infections may indirectly impact ASD risk, as some studies have linked maternal immune activation during pregnancy to a higher risk of ASD in offspring (5, 7).

II. The Link Between Breastfeeding and ASD Prevention:

Nutritional Factors:

Breastfeeding provides optimal nutrition during the crucial early stages of brain development. Omega-3 fatty acids, found in breast milk, play a role in brain growth and function. While nutritional support is essential, the relationship between specific nutrients in breast milk and ASD risk remains a subject of ongoing research (5, 7, 8).

Hormones and Neurotransmitters:

Breast milk contains various hormones and neurotransmitters that influence infant brain development and behavior. Oxytocin, for example, fosters bonding between mother and child. The role of these bioactive molecules in ASD prevention warrants further investigations (2, 5).

Gut Microbiota:

Breast milk contributes to the establishment of a healthy gut microbiota in infants. Emerging research suggests a connection between gut health and neurodevelopment. An imbalanced gut microbiome early in life may be associated with a higher risk of neurodevelopmental disorders, including ASD (5, 9).

III. Breastfeeding Duration and ASD Prevention:

Duration Matters:

Studies examining the relationship between breastfeeding duration and ASD risk have yielded mixed results. While some suggest a protective effect associated with longer breastfeeding, others do not find a significant association. The optimal duration for breastfeeding, if it indeed offers protection, remains uncertain (5).

Individual Variation:

It is essential to recognize that individual variation in response to breastfeeding exists. Factors such as genetics, maternal health, and infant temperament may influence the degree of protection breastfeeding provides (5).

IV. The Complex Interplay of Factors:

Genetic and Environmental Factors:

Genetic predisposition to ASD plays a significant role in its development. The interaction between genetic susceptibility and breastfeeding's potential protective effects requires further exploration. Some individuals with a strong genetic predisposition may still develop ASD despite being breastfed, emphasizing the multifactorial nature of ASD. Breastfeeding is just one of many environmental factors that may influence ASD risk. Other factors, such as maternal age, prenatal nutrition, and exposure to toxins, also contribute to the complex interplay. Research must consider the cumulative impact of multiple environmental factors on ASD development (1, 10).

V. Limitations and Considerations:

Research Challenges:

Conducting controlled studies on breastfeeding and ASD prevention is challenging. Factors such as ethical considerations and difficulties in controlling confounding variables make it challenging to draw definitive conclusions (5, 7).

Breastfeeding Barriers:

Recognizing that not all mothers can breastfeed or do so for an extended period is essential. Social, economic, and medical factors can limit breastfeeding duration. Public health efforts should focus on providing support and resources to help mothers make informed choices regarding infant nutrition (5, 7).

VI. The Holistic Approach to ASD Prevention:**Early Intervention:**

While breastfeeding may play a role in ASD prevention, it is not a standalone solution. Early intervention, such as developmental screenings and therapy, remains crucial for improving outcomes in children at risk of or diagnosed with ASD (6).

Comprehensive Care:

ASD prevention and management require a holistic approach that encompasses genetic awareness, environmental precautions, access to healthcare, and support for individuals with ASD and their families. Public health initiatives should prioritize early detection and intervention, as well as promoting a nurturing and inclusive society (2).

Conclusion:

Breastfeeding is a multifaceted nutritional and immunological resource that offers numerous benefits to infants, including potential contributions to ASD prevention. While research in this area is ongoing, it is clear that breastfeeding provides essential nutrients and immune protection during a critical period of brain development. However, the relationship between breastfeeding and ASD risk is complex, influenced by genetic, environmental, and individual factors. It is essential to recognize that breastfeeding, while valuable, is not a guaranteed method of preventing ASD. A comprehensive approach to ASD prevention involves genetic awareness, environmental precautions, early intervention, and societal support. As our understanding of the interplay between breastfeeding and ASD risk evolves, public health efforts should focus on providing resources, education, and support to empower parents to make informed choices regarding infant nutrition and overall well-being. Ultimately, the goal is to create an environment where all children, regardless of their developmental path, have the opportunity to thrive and reach their full potential.

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References:

1. El-Tellawy, M. M., Ahmad, A. R., Saad, K., Alruwaili, T. A. M., AbdelMoneim, I. M., Shaaban, I., Alinad, A. K. M., Albulayhid, S. B. H., & Khalaf, S. M. (2022). Effect of hyperbaric oxygen

- therapy and Tomatis sound therapy in children with autism spectrum disorder. *Progress in neuro-psychopharmacology & biological psychiatry*, 113, 110457. <https://doi.org/10.1016/j.pnpbp.2021.110457>.
2. Barik S, Patnaik L, Pattanaik S (2023) Autism Spectrum Disorders-A Review on The Preventive Aspects. *Natl J Community Med* 14(6):391-398. DOI: 10.55489/njcm.140620232975.
 3. Saad, K., Abdallah, A. M., Abdel-Rahman, A. A., Al-Atram, A. A., Abdel-Raheem, Y. F., Gad, E. F., Abo-Elela, M. G. M., Elserogy, Y. M., Elhoufey, A., Nigm, D. A., Nagiub Abdelsalam, E. M., & Alruwaili, T. A. M. (2020). Polymorphism of interleukin-1 β and interleukin-1 receptor antagonist genes in children with autism spectrum disorders. *Progress in neuro-psychopharmacology & biological psychiatry*, 103, 109999. <https://doi.org/10.1016/j.pnpbp.2020.109999>.
 4. Saad, K., Abdel-Rahman, A. A., Al-Atram, A. A., Abdallah, A. M., Elhoufey, A., Abdelsalam, E. M. N., Nigm, D. A., Elshora, O., Ahmad, A. R., El-Tellawy, M. M., & Mahmoud, K. H. (2022). Serum Galanin in Children with Autism Spectrum Disorder. *Child psychiatry and human development*, 53(2), 300–306. <https://doi.org/10.1007/s10578-021-01127-4>.
 5. Tseng, P. T., Chen, Y. W., Stubbs, B., Carvalho, A. F., Whiteley, P., Tang, C. H., Yang, W. C., Chen, T. Y., Li, D. J., Chu, C. S., Yang, W. C., Liang, H. Y., Wu, C. K., Yen, C. F., & Lin, P. Y. (2019). Maternal breastfeeding and autism spectrum disorder in children: A systematic review and meta-analysis. *Nutritional neuroscience*, 22(5), 354–362. <https://doi.org/10.1080/1028415X.2017.1388598>.
 6. Steinman G. (2020). The putative etiology and prevention of autism. *Progress in molecular biology and translational science*, 173, 1–34. doi.org/10.1016/bs.pmbts.2020.04.013.
 7. El-Houfey AA, Saad K, Abbas AM, Mahmoud SR, Wadani M (2018). Factors that influence exclusive breastfeeding: A literature review. *International Journal of Nursing Didactics* 7 (11), 24-31.
 8. Bjørklund, G., Waly, M. I., Al-Farsi, Y., Saad, K., Dadar, M., Rahman, M. M., Elhoufey, A., Chirumbolo, S., Jóźwik-Pruska, J., & Kałużna-Czaplińska, J. (2019). The Role of Vitamins in Autism Spectrum Disorder: What Do We Know? *Journal of molecular neuroscience : MN*, 67(3), 373–387. <https://doi.org/10.1007/s12031-018-1237-5>.
 9. Shaaban, S. Y., El Gendy, Y. G., Mehanna, N. S., El-Senousy, W. M., El-Feki, H. S. A., Saad, K., & El-Asheer, O. M. (2018). The role of probiotics in children with autism spectrum disorder: A prospective, open-label study. *Nutritional neuroscience*, 21(9), 676–681. <https://doi.org/10.1080/1028415X.2017.1347746>.
 10. Saad K, Hammad E, Abdel-rahman AA, Sobhy KM (2013). Autistic symptoms in late diagnosed phenylketonuric children in Upper Egypt. *Journal of Neurology Research* 3 (3-4), 122-129. <https://doi.org/10.4021/jnr221w>.