Journal of Multidisciplinary Education, Science and Technology

VOLUME-01, ISSUE-01, March 2026

FACTORS AFFECTING THE DEVELOPMENT OF INTESTINAL MICROFLORA IN CHILDREN

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DOI: https://zenodo.org/records/19039500

Abstract: This article analyzes the formation of the gut microbiome in children, its impact on the body, and the main influencing factors. The role of birth mode, feeding type, and environmental conditions in the development of intestinal microbiota is also discussed.

Keywords: gut microbiota, immune system, bifidobacteria, lactobacilli, child health, nutrition.

The development of the intestinal microbiota in children is a complex biological process influenced by multiple stages and shaped by genetic, physiological, and environmental factors. This process begins during the prenatal period and continues under the influence of factors such as the mode of delivery, nutritional regimen, antibiotic therapy, environmental conditions, and hygiene and sanitation standards. The early formation of the child's microbiome lays the foundation for the development of the immune system, metabolic processes, internal organ function, and the body's ability to resist various diseases. According to current data, natural (vaginal) birth creates optimal conditions for the healthy and balanced development of a child's gut microbiota. In this case, the child acquires the mother's vaginal and intestinal flora, which serve as a foundation for the formation of their own microbiome. In contrast, children born via cesarean section are colonized primarily by microbes from the surrounding environment and hospital setting, leading to deviations from normal microbiota composition and, in some cases, associated health complications. Feeding type is also a key determinant in microbiome development. Breastfeeding supports the enrichment of the microbiome with beneficial bifidobacteria and lactobacilli while reducing the number of pathogenic and conditionally pathogenic bacteria. Breast milk contains immunologically active components such as lactoferrin, oligosaccharides, secretory IgA, probiotic bacteria, and others, which play a significant role in modulating the infant's immune system and maintaining microbiome stability. Moreover, early and inappropriate use of antibiotics has been shown to negatively affect the development of the microbiome, reducing its resistance to various diseases. This impact is particularly pronounced in the early weeks and months after birth, during which the microbiota is still in the formative stage. Recent studies confirm that microbial imbalance (dysbiosis) in children can affect not only the functioning of internal organs but also brain development,

psychological state, and neuroendocrine system function. This positions microbiome research as one of the most promising directions in pediatrics and general medicine.

Conclusion: The formation of the intestinal microbiota in children is a multifactorial, complex, and long-term process. Each stage directly affects the child's immunological, metabolic, and physiological development. Scientific evidence suggests that the initial formation of the microbiota begins not only during delivery but also in the prenatal period. Therefore, maternal health—especially the state of maternal microbiocenosis during pregnancy—plays a decisive role in determining the child's future microbiome composition. The balanced and proper development of intestinal microflora plays a critical role in stimulating the immune system, providing effective defense against pathogenic flora, absorbing nutrients, synthesizing vitamins, and ensuring metabolic functions. Disruptions in microbiota development can increase the risk of allergies, autoimmune diseases, obesity, type 1 and type 2 diabetes, functional bowel disorders, and other complex conditions in children. Key factors influencing microbiome development include the mode of delivery, type of feeding (especially breastfeeding or formula feeding), sanitary and hygiene conditions, use of antibiotics, and geographical environment. Vaginal delivery and breastfeeding create optimal biological conditions for the child's health. Hence, it is essential to develop preventive and clinical guidelines that support the proper formation of the child's microbiota based on these factors. Future research should focus on a deeper understanding of pediatric microbiome development and the creation of individualized approaches for each child. Developing nutrition- and therapy-based models grounded in microbiome science could mark the beginning of a new era in medicine. In this context, monitoring the microbiome, scientifically validated and targeted use of prebiotics and probiotics, and the rational use of antibiotics are strategic priorities. In conclusion, the healthy and balanced development of gut microbiota in children is a fundamental factor not only for their childhood health but also for long-term physiological stability and disease resistance throughout life. Comprehensive analysis and regulation of the influencing factors can significantly enhance the effectiveness of prevention and treatment strategies in pediatric practice.

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