The Role of the Microbiome in the Diagnosis and Treatment of Childhood Infectious Diseases: A Narrative Review

Rufai AI,
Department of Paediatrics, Usmanu Danfodiyo University Teaching Hospital, (UDUTH), Sokoto, Nigeria.
*Corresponding author:
Dr Rufai Abiodun Idrees, Department of Paediatrics, Usmanu Danfodiyo University Teaching Hospital, Sokoto, Nigeria.
Email: idreesrufai8@gmail.com. Mobile number: +234 8169254626.

Introduction: The human microbiome plays an integral role in the maintenance of health and the development of disease. It is also emerging as a key factor in guiding diagnostic strategies and informing therapeutic interventions especially in childhood infectious diseases.

Objectives: This review explores the complex interplay between the microbiome and childhood infectious diseases, focusing on its role in diagnosis and treatment.

Outcome: The microbiome refers to the collective genome of all microorganisms in human body. Early microbiome patterns are associated with immune system development, mode of delivery, feeding practices, antibiotic uses, vaccine responses and geographical location. Several studies have shown that variations in the nasopharyngeal and oropharyngeal microbiota can influence the incidence and severity of respiratory tract infections in children. Similarly, disruption of gut microbial balance can lead to increased susceptibility to pathogens.

Microbiome profiling using high-throughput sequencing technologies (e.g., 16S rRNA gene sequencing, shotgun metagenomics) offers novel diagnostic tools for childhood infectious diseases, identifying pathogens that are difficult to culture or missed by traditional diagnostics. Alterations in the diversity of the microbiome can act as biomarkers for infection or disease progression as in neonatal necrotizing enterocolitis. Similarly, gut microbiota profiling may differentiate between viral and bacterial causes of diarrhea or respiratory illness, guiding antimicrobial therapy.

Evidence supports the use of dietary modifications, probiotics and prebiotics as adjuncts in acute infectious diarrhea, respiratory tract infections, antibiotic-associated diarrhea and treatment of necrotizing enterocolitis. Also emerging is the role of phage therapy and faecal Microbiota Transplantation (FMT).

Conclusion: Understanding and harnessing the power of the microbiome represents a paradigm shifts in the diagnostic and therapeutic options of childhood infectious diseases. A major challenge identified in Sub-saharan Africa is the low awareness and dearth of research in the field of microbiome. There is the need for increased awareness and focused researches in our regions.

Key words: Microbiome, diagnosis, treatment, childhood, infectious diseases.