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REVIEW

Clinical implications of dysbiosis in Autism Spectrum Disorder

Implicancias clínicas de la disbiosis en el Trastorno del Espectro Autista

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ABSTRACT

Autism Spectrum Disorder (ASD) has been addressed as a challenge in the field of neurodevelopment due to its clinical and etiological complexity. In recent years, interest in non-traditional factors, such as the gut microbiota, has intensified, with its influence on the microbiota-gut-brain axis being the subject of multiple studies. Microbial alterations have been documented in people with ASD, which have been linked to gastrointestinal and behavioural symptoms. Therapies such as probiotics, specific diets and faecal transfer have also been explored, showing clinical improvements in some cases. However, the causal relationship between dysbiosis and ASD remained under debate, highlighting the need for more rigorous studies to understand this complex interaction.

Keywords: Autism; Neurotransmitters; Treatment; Dysbiosis; Microbiota.

RESUMEN

El Trastorno del Espectro Autista (TEA) fue abordado como un desafío en el campo del neurodesarrollo, debido a su complejidad clínica y etiológica. En los últimos años, se intensificó el interés por factores no tradicionales, como la microbiota intestinal, cuya influencia en el eje microbiota-intestino-cerebro fue objeto de múltiples investigaciones. Se documentaron alteraciones microbianas en personas con TEA, lo que se relacionó con síntomas gastrointestinales y conductuales. También se exploraron terapias como probióticos, dietas específicas y transferencia fecal, las cuales mostraron mejoras clínicas en algunos casos. No obstante, la relación causal entre disbiosis y TEA permaneció en debate, lo que subrayó la necesidad de estudios más rigurosos para comprender esta interacción compleja.

Palabras clave: Autismo; Neurotransmisores; Tratamiento; Disbiosis; Microbiota.

INTRODUCTION

Autism Spectrum Disorder (ASD) represents one of the main challenges in the field of neurodevelopment today, not only because of its clinical and etiological complexity but also because of the heterogeneity of its manifestations and responses to treatment. In recent years, scientific interest has intensified in exploring non-traditional factors that may be involved in its pathophysiology beyond the classic genetic and neurological components. In this context, the gut microbiota has emerged as a key element in understanding ASD, opening up new diagnostic and therapeutic possibilities through the microbiota-gut-brain axis. This paper addresses the potential role of intestinal dysbiosis in the symptomatic expression of ASD and the clinical implications of this relationship.

DEVELOPMENT

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder characterized by persistent deficits in communication and social interaction, as well as restrictive and repetitive patterns of behavior, interests, or activities. The Diagnostic and Statistical Manual of Mental Disorders, in its fifth edition (DSM-5), establishes the diagnostic criteria and highlights the phenotypic variability of the disorder, which can manifest itself from childhood and persist throughout the life cycle.[1,2]

From an etiopathogenic perspective, ASD has been addressed through multifactorial models that integrate genetic, epigenetic, immunological, environmental, and neurobiological components. However, in recent decades, an innovative approach has emerged that places the gut microbiota at the center of understanding the pathophysiological mechanisms of ASD. In this regard, several authors have documented significant alterations in the gut microbial composition of individuals with ASD, a phenomenon known as dysbiosis, which could be involved in the exacerbation of the behavioral and gastrointestinal symptoms characteristic of the disorder.[3,4]

The so-called microbiota-gut-brain axis has been widely described as a bidirectional communication system between the gastrointestinal tract and the central nervous system (CNS), mediated by neuroimmunological, neuroendocrine, and metabolic mechanisms.[5,6] In this context, the gut microbiota acts as a key modulator of neurological, cognitive, and behavioral functions by influencing the production of neurotransmitters (such as GABA and serotonin), short-chain fatty acid metabolism, and the integrity of the blood-brain barrier.

Pioneering studies such as those by Hsiao et al.[7] demonstrated, using mouse models, that dysbiotic gut microbiota from children with ASD induced alterations in social behavior and an increase in stereotypical behaviors, suggesting a causal link between microbial composition and autistic symptoms. Similarly, Kang et al.[8] observed in clinical studies that the administration of fecal microbiota transfer (FMT) therapies significantly improved both gastrointestinal symptoms and the severity of ASD symptoms, supporting the hypothesis of an active role of the microbiota in the pathophysiology of the disorder.

On the other hand, clinical evidence reveals that between 46 % and 84 % of children with ASD have chronic gastrointestinal symptoms, such as constipation, diarrhea, or abdominal pain, whose etiology could be associated with intestinal microbial imbalances.[9,10] Proinflammatory bacterial species, such as Clostridium and Desulfovibrio, and a decrease in beneficial commensal bacteria, such as Bifidobacterium and Lactobacillus, have been implicated in these processes by altering intestinal permeability and triggering immune responses that could affect brain function.[11,12]

Regarding therapeutic strategies, probiotics, prebiotics, and specialized diets (e.g., gluten- and casein-free) have been investigated as potential modulators of the gut microbiota. Studies such as those by Shaaban et al.[13] and Sanctuary et al.[14] documented clinical improvements in digestive and behavioral symptoms following the administration of specific strains of Lactobacillus and Bifidobacterium, with positive effects on social interaction and the reduction of repetitive behaviors. However, methodological heterogeneity and limited sample sizes are significant limitations to generalizing these findings.[15,16]

Finally, the causal relationship between dysbiosis and ASD remains a subject of debate. While some authors suggest that dysbiosis may contribute to the onset or intensification of ASD symptoms, others argue that alterations in the microbiota are a consequence of restrictive eating habits, frequent antibiotic use, or the characteristics of the disorder itself.[17,18] This controversy highlights the need for longitudinal, multicenter, and controlled studies to clarify the mechanisms underlying this complex interaction.

CONCLUSIONS

Current evidence suggests that the gut microbiota plays an important role in the pathophysiology of autism spectrum disorder, not only because of its possible influence on the gastrointestinal symptoms frequently seen in these patients but also because of its ability to modulate neurobehavioral functions. Experimental and clinical findings point to a bidirectional relationship between the gut and the brain, where dysbiosis could act as a contributing factor in the expression of autistic symptoms. However, fundamental questions remain regarding the direction and causality of this association, highlighting the need for more robust and controlled research. In this regard, integrating the microbiological approach into the study of ASD represents a promising avenue for progress toward more personalized and effective interventions.

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CONFLICT OF INTEREST

None.

AUTHOR CONTRIBUTION

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