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Diet Patterns, the Gut Microbiome, Mood Disorders and Alzheimer's Disease

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Abstract

A literature review on When the microbiome helps the brain-current evidence, The link between the gut microbiome and Alzheimer's disease: From the perspective of newly revised criteria for diagnosis and staging of Alzheimer's disease), Relationship between the gut microbiota and Alzheimer's disease: A systematic review, Alzheimer's disease and depression in the elderly: A trajectory linking gut microbiota and serotonin signaling, Modifying the diet and gut microbiota to prevent and manage neurodegenerative diseases, Association of probiotics, prebiotics, symbiotic or yogurt supplement and When the microbiome helps the brain-current evidence.

Keywords: Alzheimer's Disease; Neurodegenerative Diseases; Depression; Gut Microbiota

Introduction

Presently, 6.7 million Americans over 65 suffer from Alzheimer's disease [1]. By 2060, it is projected to reach 13.8 million. The APOE 4 genotype is the most significant genetic risk factor for developing AD.

Recent research has highlighted the significant role of the gut-brain axis, with particular attention to how gut microbiota alterations (dysbiosis) may influence the pathophysiology of Alzheimer's Disease (AD) and other neuropsychiatric disorders like depression and bipolar disorder. There is growing interest in how dietary interventions, probiotic supplementation, and microbiome diversity might mitigate or slow the progression of neurodegenerative conditions.

Methodology

A literature review on When the microbiome helps the brain-current evidence, The link between the gut microbiome and Alzheimer's disease: From the perspective of newly revised criteria for diagnosis and staging of Alzheimer's disease. Relationship between the gut microbiota and Alzheimer's disease: A systematic review, Alzheimer's disease, and depression in the elderly: A trajectory linking gut microbiota and serotonin signaling, Modifying the diet and gut microbiota to prevent and manage neurodegenerative diseases, Association of probiotics, prebiotics, symbiotic, or yogurt supplement and When the microbiome helps the brain-current evidence.

Results

APOE4 remains the strongest genetic risk factor for AD, but lifestyle and microbial influences are increasingly recognized. The gut-brain axis is implicated not only in AD but also in depression, bipolar disorder, and potentially Parkinson's. The interplay between diet, probiotics, and gut health provides a preventive and therapeutic avenue for managing AD and related conditions. Further clinical trials are necessary to validate the long-term efficacy of microbiome-targeted interventions.

Key Insights from Reviewed Literature

Microbiome Composition in AD

AD patients commonly exhibit decreased firmicutes and increased Bacteroidetes, indicative of microbial imbalance. Four key bacteria are involved in brain-microbiome interaction: proteobacteria, firmicutes, actinobacteria and bacteroidetes [1].

Gut dysbiosis is also linked to diseases like diabetes, cardiovascular conditions and cancer, as per Steven Gundry [2].

Microbiota and Early Symptoms

In Parkinson's disease, gastrointestinal symptoms like constipation and bloating often precede motor dysfunction, implying an early gut-brain pathway disruption.

Antibiotic usage can severely disrupt gut microbiota, possibly contributing to mental disorders and AD [3]. Gut microbiota dysbiosis and serotonin neurotransmission dysfunctions: An essential link between Alzheimer's disease and neuropsychiatric symptoms. Research finds that there is robust evidence that antidepressants can shape GM and revert the difference in gut microbe associated with depressive symptoms [4]. Gut dysbiosis and leaky guts are presented in patients with cancer, heart disease, diabetes and joint disease, as mentioned by Steven Gundry [2].

Probiotics, Depression and Bipolar Disorder

Probiotics such as *Bifidobacterium* and *Lactobacillus* have improved depressive symptoms, particularly in individuals without underlying conditions [5]. Depression is a neuropsychiatric disorder troubling nearly 175 million people globally [5].

Consumption of yogurt and other probiotic products is associated with reduced depression risk, especially among middle-aged adults and men.

Probiotics and AD Pathophysiology

Probiotic strain SLAB51 reduced amyloid-beta deposition and neuronal damage in animal models [1]. Probiotic interventions may also modulate the immune response, inflammation and glucose metabolism factors involved in AD pathology.

There is a high association between the decrease in the richness of the microbiota and the incidence of AD. The composition of gut microbiota, such as *Bacteroides* or bacteria such as *Clostridium difficile*, is a factor that is specifically associated with dementia and AD [6].

Mediterranean Diet and Gut-Brain Health

The Mediterranean Diet (MD), rich in whole grains, leafy greens, berries, fish and nuts, is associated with lower AD risk and slower cognitive decline [7]. Diet significantly shapes gut microbial diversity and integrity, influencing mental and neurological health.

Diagnostic Innovations

The MTBR-tau243 blood test offers a breakthrough in early AD diagnosis, identifying tau tangles and helping distinguish AD-related cognitive decline by Randall J. Bateman, MD.

Conclusion

The reviewed literature supports a robust link between gut microbiota composition and brain health, especially in the context of neurodegeneration and mood disorders. Probiotic supplementation and adherence to the mediterranean diet emerge as promising, non-invasive strategies to reduce the burden of Alzheimer's and related disorders.

Conflict of Interests

The authors have no conflict of interest to declare related to this article.

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