

The Gut Microbiome's Role in Psychiatric Disorders

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Introduction

The role of the gut microbiome in mental health has received a lot of attention in recent years, with several breakthroughs occurring in the last decade. Its implications in a variety of psychiatric disorders, including anxiety, depression, autism, and schizophrenia, are discussed. This review included relevant rodent studies as well as human studies. There appears to be a link between the gut microbiome and these pathologies, with the link being highlighted in both rodents and humans. The results obtained in murine models are consistent with the results obtained from patients; however, there have been fewer studies on anxiety in humans. Humans have undergone the process of sequencing and analysing the microbiome for several other pathologies [1].

Description

The gut microbiome is a diverse community of microorganisms that coexist in a symbiotic relationship within the human host. Firmicutes phyla, particularly Clostridium and Lactobacillus species, and Bacteroidetes phyla, particularly Bacteroides and Prevotella species, have the most abundant species found in the gut. Other less common phyla include Proteobacteria, Actinobacteria, Fusobacteria, Spirochaetes, Verrucomicrobia, and Lentisphaerae. The gut microbiome is important for several functions, including digestion, the production of essential metabolites, and immune system development. Dysbiosis of the gut microbiome has been linked to a number of diseases, including colorectal cancer, inflammatory bowel disease, diabetes, and metabolic syndrome [2].

The central nervous system, the enteric nervous system, and the autonomous nervous system, as well as neuroendocrine and neuroimmune pathways, all influence the microbiota-gut-brain axis. The microbiota can influence neuronal function directly or indirectly by producing vitamins and neuroactive microbial metabolites such as short-chain fatty acids. Changes in the gut microbiome can also influence the synthesis of key neurotransmitters like melatonin, gamma-aminobutyric acid, serotonin, histamine, and acetylcholine. Studies on germ-free mice have revealed that the gut microbiome is required for normal brain development, particularly the development of hippocampal and microglial morphology. Furthermore, germ-free mice with no gut bacteria develop specific immune, neuronal, and metabolic impairments, as well as gastrointestinal tract abnormalities. When compared to specific-pathogen-free mice, Sudo et al. found that exposure to native microbiota during early development, when brain plasticity is still conserved, is required for the hypothalamic-pituitary-adrenal system to become ready for inhibitory neural regulation of the HPA axis after stress. The administration of oral antimicrobials to SPF mice resulted in a change in microbiota composition, which was accompanied by an increase in exploratory activity.

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The methods used in this review article were based on a search of the PubMed database for all related published studies. The keywords "gut microbiome," "gut-brain axis," "psychiatric disorders," "depression," "anxiety," "autism," "schizophrenia," "probiotics," and "postbiotics" were used in the selection. We discovered articles and, after exclusion, 57 qualifying studies remained. The year of publication, the relevance of the title and abstract, and the availability of the full-text article were the inclusion criteria. The exclusion criteria were studies that were not only psychiatric in nature, but also had titles and abstracts that were irrelevant to the purpose of our study [3].

Probiotics are live microorganisms that have health benefits. They frequently contain lactic-acid producing bacteria from the Bifidobacterium and Lactobacillus genera. Psychobiotics are probiotics that alter cognitive functions, mood, and anxiety, and the term has recently been expanded to include all interventions that alter the microbiota and influence the relationships between bacteria and the brain. A meta-analysis found that supplementing with probiotics improved preclinical psychological symptoms of anxiety and depression in healthy people. Although the mechanism by which probiotics induce beneficial effects on psychiatric disorders is unknown, it is believed that probiotics promote the biosynthesis of neurotransmitters such as GABA, dopamine, serotonin, norepinephrine, and acetylcholine, which improve mood symptoms [4,5].

Conclusion

There is still a scarcity of human studies in this field. Future research is required to properly demonstrate the gut microbiome's role in mental health, how gut microorganisms may influence brain function, and possibly establish treatments for psychiatric pathologies that directly target the microbiome. Probiotics have been shown to reduce the severity of symptoms associated with depression and anxiety in studies on their effects in psychiatric disorders. According to some studies, they may also play a role in reducing the gastrointestinal symptoms associated with antipsychotic treatment. However, there is a lack of clinical trials on the effects of probiotics in the psychiatric field; thus, additional research is required to establish the potential of probiotics as an adjuvant therapy in various psychiatric disorders.

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