

Unraveling the Gut-Brain Connection in Alcohol Use Disorder: Microbiome Dysbiosis And Probiotic Therapy As Emerging Treatment Pathways

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Abstract : Alcohol use disorder (AUD) presents significant health challenges worldwide and is particularly concerning in Slovenia, where high alcohol consumption contributes to elevated rates of comorbidities, including depression and suicide. This review examines emerging evidence linking gut microbiome dysbiosis to AUD, exploring whether gut microbiome alterations merely result from alcohol use or actively contribute to the persistence of addiction. Additionally, it discusses how microbial changes may influence psychological symptoms, including anxiety and depressive states, which are closely associated with suicidality in this population. To address gaps in existing research, a systematic literature search was conducted through PubMed, Web of Science, and ScienceDirect. Inclusion criteria focused on studies examining gut microbiome changes in AUD, particularly those assessing gut-brain axis interactions and microbial species impacting inflammation and neurotransmitter pathways. Studies were excluded if they lacked peer review or did not specifically assess microbiome effects on mental health outcomes. A qualitative literature review approach was applied, synthesizing findings into key themes on microbial changes, neuroinflammatory pathways, and treatment implications. Data were organized into tables to provide a clear comparison of microbiota alterations across studies, highlighting specific bacterial species and their potential effects on AUD. This review emphasizes patterns in AUD patients, where reductions in anti-inflammatory species, such as *Faecalibacterium prausnitzii* and *Roseburia intestinalis*, coincide with increases in pro-inflammatory bacteria like *Enterococcus faecalis* and *Lactobacillus rhamnosus*. These shifts contribute to increased gut permeability and systemic inflammation, potentially influencing the kynurenine pathway, which is linked to depressive symptoms and elevated alcohol cravings. Furthermore, the review explores the potential of probiotic therapies targeting these microbial imbalances as adjunctive treatments for AUD, particularly those focusing on strains that support anti-inflammatory pathways and gut barrier integrity. Restoring microbial homeostasis through probiotics or fecal microbiota transplantation may not only reduce inflammation but also alleviate mental health symptoms associated with addiction, including suicidality. The findings underscore the need for further clinical trials assessing microbiome-targeted therapies as innovative, multifaceted approaches to AUD treatment in Slovenia and beyond.

Keywords : alcohol use disorder, gut-brain axis, microbiome dysbiosis, probiotic therapy.

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