

# Literature review on the importance of intestinal microbiota in depressive disorders

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**Abstract.** Objective: To carry out a literary review on the gut-brain theme and its relationship with mental health. Material and methods: This is a systematic review, scientific articles were selected between 2013 and 2023. The search was carried out using Google Scholar databases. Results: This review showed that the intestinal microbiota is related to psychological disorders, as well as the importance of psychobiotics and how they interfere in beneficial way for health. Conclusion: The intestinal microbiota interferes with the functioning of the enteric nervous system, these changes linked to bad lifestyle habits can induce the generation of psychological disorders.

**Keywords.** Gastrointestinal Microbiome; Depression; Brain-Gut Axis.

## 1. Introduction

According to the World Health Organization's global report conducted between 2005 and 2015, depression affects more than 322 million people worldwide. It is characterized by a sad, empty, or irritable mood, sharp variations in affect, related to somatic, cognitive, and neurovegetative changes, significantly impairing an individual's ability to carry out daily activities[1,2].

There has been much discussion about the brain-gut axis, which serves as the communication channel between neuronal, endocrine, nutritional, and immunological pathways, influencing the pathogenesis of depression. As a result, the microbiota has emerged as a potential modulator of human behavior and its role in the individual's mental health recovery or maintenance[1].

Intestinal microbiota is defined as a collection of microorganisms present in the gastrointestinal tract, with the human body composed of approximately 100 trillion bacteria, 80% of which reside in the intestine, ten times more than human body cells. Within our microbiome are 100 different species of bacteria that encode 150 times more genes than our human genome. They also perform the biosynthesis of folate, vitamins B and K, amino acids, polyphenols, and short-chain fatty acids, modulate intestinal motility, protect the host from pathogens, stimulate and mature the immune system, and epithelial cells[3,4,5].

However, the composition of the microbiota can be altered by various factors such as the use of

antibiotics, obesity, allergies, inflammatory, and metabolic diseases. This imbalance in the microbiota is referred to as dysbiosis, characterized by alterations in the activity and location of the intestinal microbiota, where pathogenic bacteria predominate over beneficial ones[6].

Therefore, a literature review was conducted to examine the main mechanisms correlating intestinal microbiota with the pathogenesis of depression.

## 2. Methodology

A bibliographic survey was carried out using Google Scholar databases. The following descriptors were sought for the search: Gastrointestinal Microbiome; depression; Brain-Gut Axis, with publication date in the last 10 years, from 2013 to 2023. The articles were read, evaluated and selected according to their eligibility and quality.

## 3. Results and discussion

### 3.1 Depression

According to the American Psychological Association, depressive disorders can be classified in different ways. According to the Diagnostic and Statistical Manual of Mental Disorders, the most common depression is classified and called major depressive disorder [7].

Mild, moderate or severe depressive

disorders, with or without psychotic symptoms, are characterized by the presence of depressed mood, loss of interest and pleasure, lack of energy, feelings of guilt or low self-esteem, sleep or appetite disturbances and low concentration. Furthermore, there is evidence that the presence of depression increases the risk of cardiovascular diseases, including heart attack, hemorrhagic stroke and peripheral arterial disease [8].

Studies suggest that depression is a multifactorial disease, resulting from the complex interaction between biological, psychological and social factors. Among biological factors, dysfunction of the central nervous system, including monoaminergic pathways and the hypothalamic-pituitary-adrenal axis, has been widely studied. [9].

Furthermore, there is a series of evidence that shows chemical changes in the brain of a depressed individual, mainly in relation to neurotransmitters, such as serotonin and noradrenaline, substances that transmit nerve impulses between cells. Contrary to what is commonly thought, psychological and social factors are often consequences and not causes of depression [9].

### 3.2 Intestinal microbiota and gut-brain axis

The intestinal microbiota is a complex ecosystem with three stakeholders, namely the microbiota, nutrients and host cells. The colonization of microorganisms in the human body is called the human microbiome, composed of fungi, bacteria, protozoa, viruses and archaea, where they all reside in the superficial barrier of various epithelia of the body, the intestinal microbiome contains trillions of bacteria that, when in balance, they are symbiotic with the host and perform important metabolic and immune functions [10,11].

It is believed that the intestinal microbiota directly influences neuroendocrine intercellular signaling and communication between the enteric nervous system and the central nervous system, a set known as the brain-gut axis. This innervation occurs through neural circuits that constitute the enteric nervous system, which are responsible for the motor behavior of the gastrointestinal tract by conducting information to the central nervous system through extrinsic neurons [12,13].

### 3.3 Dysbiosis and symbiotics

The imbalance of the microbiota is characterized by imbalances in bacterial colonization in which harmful bacteria prevail over beneficial ones, resulting in a significant increase in some illnesses. Furthermore, dysbiosis presents multiple causal factors that favor the emergence of intestinal imbalance, such as metabolic, autoimmune, neurological and inflammatory disorders. These factors can be of endogenous and exogenous origin, ranging from momentary to prolonged [14].

The treatment of intestinal dysbiosis can be carried out with the use of medication and through

changes in eating habits. Therefore, it is recommended to consume organic foods, free from pesticides and additives such as nitrates, nitrites, glutamate, sulphites, and foods free from industrialized and irritating foods [15].

Within this context, the best nutritional strategy is the use of synbiotics, which are made up of prebiotics and probiotics. Prebiotics are considered non-digestible food components, which selectively stimulate the proliferation or activity of beneficial bacteria in the intestinal environment, promoting marked benefits to the host's health. Probiotics are live microorganisms that colonize the intestine and have beneficial effects on human health, when administered in adequate doses. They have an important influence on the reestablishment and maintenance of the intestinal microbiota through physical, antimicrobial, and immune effects, advantageous for the host [16, 17, 18].

## 4. Conclusion

Despite the few studies in humans, it is clear that there is an intense interrelationship between the microbiota, the gut-brain axis and mental pathologies, creating a new perspective on the pathophysiology, prevention and treatment of depression. , with the modulation of the intestinal microbiota.

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