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Dysbiosis and depressive disorders. Survey review

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Abstract

A significant increase in the incidence of depression, change of lifestyle and nutrition, forces researchers to seek understanding of the various mechanisms of the formation of such a disorder. Numerous studies draw attention to dysbiosis - a disorder of the composition and function of the intestinal microflora. In current studies, strong correlations can be observed between microbiota disorders and the occurrence of autoimmune and inflammatory diseases.

Introduction

Depressive disorders are one of the contemporary problems of the world. According to the World Health Organization (WHO), this will be the second most common disease [1]. Numerous studies indicate that inflammatory factors may be at the root of this disorder. Significant dependencies are associated with intestinal microflora. Particular attention is paid to the numerous connections of depression and physiological reactions of the organism associated with inflammation. It is indicated that depressive disorders may be psychoneuroimmunologic [2].

Man before birth has completely sterile microbes, shaped from the first 3-4 years of life. The first contact of the newborn with the gastrointestinal tract bacteria occurs during labor. Two groups of the bacterium Firmicutes and Bacteroidetes can be distinguished, appropriate intestinal concentration determines the proper functioning of the food system [3,4].

Researchers are focused on the role of cytokines, because they have a significant influence on individual neurochemical functions; the activity in the basal ganglia and the frontal ganglia. They also modulate the activity of the hypothalamic-pituitary axis (HPA), which is the main factor in the pathogenesis of depression [5].

The metabolites originating from microbiota signal to distant organs in the body, which allows intestinal bacteria to combine with the immune and hormonal systems with the brain (the intestinal axis) and host metabolism, as well as other functions. This communication with the micro-host is necessary to maintain the important functions of a healthy host [6]. The brain-gut axis is a network of autonomic neurons connecting the nervous system with the alimentary canal, liver and pancreas. Information between the nervous system and the intestine is transmitted through various forms, eg neuronal, metabolic and hormonal [7]. The neuronal pathway forms the intestinal nervous system (ENS), which produces neuromodulators and neurotransmitters, which are particularly important in the development of mental diseases [8]. Particular attention is paid to the influence of the "stress hormone" - cortisol, which can affect immune cells, modeling the secretion of cytokines and the state of microbiota [9].

Microbiota is a key element in the brain-intestinal axis. It significantly affects the range of neurotrophins and proteins. In animals that had poor microbiota, decreased (BDNF) and expression of the NMDA receptor [10] were found. In turn, Luczyński et al. Indicate that the lack of microbiota affects the reduction of synaptic connections in the area of the hippocampus and amygdala, responsible for memory and feeling of some emotional states [11].

Numerous studies indicate that a special role in disturbances in intestinal continuity is the activation of proinflammatory cytokines. According to the assumption that depression may be associated with intestinal inflammation, cytokines affect neurochemical functions. Antidepressants have a significant influence on the decrease in the concentration of pro-inflammatory cytokines. Drugs from the group of selective serotonin reuptake inhibitors (SSRIs) decreased mainly cytokines (IL-6 and TNFalpha), which contributed to the reduction of inflammatory status [12]. Rudkowski et al. Indicate that specific proteins that inhibit the action of cytokines, will be used in the treatment of inflammatory diseases of the intestines, at the same time pay special attention to the action of curcumin, as a factor minimizing the negative effect of cytokines on individual receptors. It is worth noting that curcumin has been known for several thousand years as anti-depressants [13, 14].

Another of the pioneering studies showing the relationship between the appropriate microbiota and emotional factors was the research of Swedish scientists conducted on mice. Using measures of physical activity and anxiety behavior, the researchers showed that germ-free mice lacking microbiota (GF) showed increased motor activity and decreased anxiety behavior compared to pathogen-specific mice (SPF) with normal intestinal microflora. This behavioral phenotype is associated with altered gene expression known to be involved in the pathways of the second messenger and long-term synaptically enhanced, in areas of the brain involved in motor control and anxiety-like behavior. GF mice exposed to the intestinal microflora showed similar features in early life, such as SPF mice, including decreased expression of PSD-95 and synaptophysin in the striatum. Hence, the results of the conducted study suggest that the process of colonization of microorganisms initiates signaling mechanisms that affect the neural circuits involved in motor control and anxiety behavior [15].

In addition, there are also studies on probiotics, which means that the method regulates the normal bacterial flora. Research carried out on a group of 124 people who received a milk

drink containing *Lactobacillus casei*. Shirota assessed their mood after 30 days. In a clinical study, volunteers participated in a double-blind, placebo-controlled, randomized study with a group parallel to PF administered for 30 days and evaluated with; Checklist for Hopkins symptoms (HSCL-90), anxiety scale and clinical depression (HADS), Stress Scale, checklist (CCL) and 24-hour cortisol measurement. Daily administration of PF significantly reduced anxiety-like behavior in rats ($P < 0.05$) and alleviated psychological stress in volunteers, measured in particular by the HSCL-90 scale (global-intensity index, $P < 0.05$, somatization, $P < 0.05$, depression, $P < 0.05$ and hostility to anger, $P < 0.05$), HADS (global HADS score, $P < 0.05$ and HADS anxiety, $P < 0.06$), and by CCL (problem solving, $P < 0.05$) and UFC level ($P < 0.05$). Research indicates favorable preliminary results [16].

Summary

Due to the growing incidence of depression, it is advisable to look for minimizing and prophylactic factors. More and more attention is paid to the connection of the correct bacterial flora with the immunity of the organism and mental health. Further research is needed on the links between intestinal microbiome and depression.

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