



## The effect of microbiota in mood disorders: Utilization of probiotics as a therapeutical approach

Hazal Altundağ<sup>\*1</sup>, Furkan Ayaz<sup>1,2</sup>

<sup>1</sup>Mersin University, Biotechnology Department, Türkiye, hazaltundag@gmail.com.tr

<sup>2</sup>Mersin University, Biotechnology Research and Application Center, Türkiye, furkanayaz@mersin.edu.tr

Cite this study: Altundağ, H., & Ayaz, F. (2023). The effect of microbiota in mood disorders: Utilization of probiotics as a therapeutical approach. *Advanced Engineering Days*, 7, 1-3

### Keywords

Anxiety  
Gut microbiota  
Probiotic  
Microorganism

### Abstract

There are trillions of microorganisms in the human body. All microbial communities in the gastrointestinal tract are intestinal microbiota. The main task of this community can be counted as; defense against diseases, digestion of food, etc. Moreover, they have effect on the human mood and behaviors. In addition to its basic functions, the brain-gut relationship, which has been the subject of many studies recently, draws attention. Based on this relationship, it is noteworthy that the microbiota disorder causes anxiety and depression, and the use of probiotics seems as a promising solution. In this proceeding review, we will be discussing this theme more in depth.

### Introduction

Trillions of beneficial and harmful bacteria live in the human body. This community is called the gut microbiota, located in the gastrointestinal system. This community plays a role in physiological development and communication with the brain, apart from the basic functions in the host such as defense against diseases and digestion of nutrients.

The development process of the intestinal microbiota begins with birth and continues to develop after birth under the influence of environmental factors [1,2]. The beginning of the developmental process is the moment of birth. As a result of different studies, the microbiota formed after vaginal birth and cesarean delivery are different from each other. It was observed that some bacteria were absent in the cesarean section and *Lactobacillus* species were found to be low. Intestinal microbiota is similar to the microbiota of the vagina in vaginal delivery and to the microorganism's similar hospital environment and mother skin in cesarean delivery [3].

This fascinating structure works in great harmony with our body and is in communication with many structures in our body. Let's move on through mammals: The nervous system in mammals is examined under two headings: central nervous system, and peripheral nervous system. The enteric nervous system connection of the central nervous system occurs with the sympathetic and parasympathetic nerves. The sympathetic and parasympathetic nerves, after leaving the hindbrain, synapse with the gastrointestinal tract. The vagus nerve is an example of this [4].

The communication pathway between the brain and the gut splits into two: The autonomic nervous system in the spinal cord, the enteric nervous system in the gut, and the vagus nerve play a role in bidirectional transmission. The first transmission pathway is the reciprocal communication between the autonomic nervous system in the spinal cord and the vagus nerve. Second, it is the transmission pathway between the autonomic nervous system in the spinal cord, the enteric nervous system in the intestine, and the vagus nerve [5].

Vagus nerve is important in brain-gut relationship. In a study, the role of the vagus nerve in transmission and the effectiveness of the bacteria were investigated by using *Lactobacillus rhamnosus* bacteria. As a result of the research; It has been determined that the vagus nerve has an important place in transmission and *L.rhamnosus* bacteria reduces anxiety in mice [6].

In case of disruption of this structure, which can communicate with the human brain in two directions, various disorders are observed. One of these is mood disorders that negatively affect the quality of life of many people.

There are many studies proving that the gut microbiota is effective on human psychology. High levels of mood disorders such as depression-anxiety were observed in people with bowel disease. There were also differences in the gut microbiota of people with this mood disorder [7]. In 2002, the WHO and FAO recognized probiotics as live microorganisms that, when administered in proper ways and amounts, enable a health benefit to the host [8]. The use of probiotics regulates the microbial balance. The two most important members of the probiotic group of microorganisms are Bifidobacterium and Lactobacillus species [9].

## Material and Method

Let's examine a study that deals with the effect of gut microbiota on psychological disorders and the results of using psychobiotics for treatment; The aim of this study was to have information about the psychological effect of the formulation containing psychobiotics (PF) in rats and humans. In the study, rats were divided into three groups and subjected to commonly used tests to obtain information about their anxiety and depression levels before the study. The treatment method was applied to each group for 14 days, and at the end of the 14th day, the same tests were repeated and the results were obtained.

In the same study; 55 people participated voluntarily. Volunteers were subjected to certain tests before the study. Participating volunteers were divided into 2 groups and exposed to probiotic formulation (PF) or placebo formulation (PL) treatment for 30 days. At the end of 30 days, the tests performed before the study were repeated and the results were obtained [12].

The effects of psychobiotics on psychological disorders show promising results for the future. As a result of clinical and pre-clinical studies, probiotic formulations; It has been proven to reduce anxiety and depression in both animals and volunteer humans. As a result of the tests, it was noted that there was a memory improvement and a strengthening in learning in rats at the pre-clinical stage [12].

## Results

The effects of psychobiotics on psychological disorders show promising results for the future. As a result of clinical and pre-clinical studies, probiotic formulations have been proven to reduce anxiety and depression in animals and humans participating in the experiment. As a result of the tests, it was noted that there was a memory improvement and a strengthening in learning in rats at the pre-clinical stage [12].

## Conclusion

New microorganism species should be discovered and new formulations should be prepared for use in different probiotic formulations. Pre-clinical and clinical studies should be increased and formulations comparable to antidepressant drugs should be obtained.

## References

1. Laursen, M. F. (2021). Gut microbiota development: influence of diet from infancy to toddlerhood. *Annals of Nutrition and Metabolism*, 77(3), 21-34.
2. Milani, C., Duranti, S., Bottacini, F., Casey, E., Turrone, F., Mahony, J., ... & Ventura, M. (2017). The first microbial colonizers of the human gut: composition, activities, and health implications of the infant gut microbiota. *Microbiology and molecular biology reviews*, 81(4), <https://doi.org/10.1128/mmb.00036-17>
3. Kalip, K., & Atak, N. (2018). Bağırsak mikrobiyotası ve sağlık. *Turkish Journal of Public Health*, 16(1), 58-73.
4. Yoo, B. B., & Mazmanian, S. K. (2017). The enteric network: interactions between the immune and nervous systems of the gut. *Immunity*, 46(6), 910-926.
5. Wang, H. X., & Wang, Y. P. (2016). Gut microbiota-brain axis. *Chinese medical journal*, 129(19), 2373-2380.
6. Bravo, J. A., Forsythe, P., Chew, M. V., Escaravage, E., Savignac, H. M., Dinan, T. G., ... & Cryan, J. F. (2011). Ingestion of Lactobacillus strain regulates emotional behavior and central GABA receptor expression in a mouse via the vagus nerve. *Proceedings of the National Academy of Sciences*, 108(38), 16050-16055.
7. Bear, T. L., Dalziel, J. E., Coad, J., Roy, N. C., Butts, C. A., & Gopal, P. K. (2020). The role of the gut microbiota in dietary interventions for depression and anxiety. *Advances in Nutrition*, 11(4), 890-907.
8. Zendeboodi, F., Khorshidian, N., Mortazavian, A. M., & da Cruz, A. G. (2020). Probiotic: conceptualization from a new approach. *Current Opinion in Food Science*, 32, 103-123.
9. Uymaz, B. (2010). Probiyotikler ve Kullanım Alanları. *Pamukkale Üniversitesi Mühendislik Bilimleri Dergisi*, 16(1), 95-104

10. do Nascimento, A. S. M., & da AnunciaÃ, T. A. (2020). Psychobiotics in daily food against psychiatric disorders. *African Journal of Food Science*, 14(6), 161-166.
11. Luo, J., Wang, T., Liang, S., Hu, X., Li, W., & Jin, F. (2014). Ingestion of *Lactobacillus* strain reduces anxiety and improves cognitive function in the hyperammonemia rat. *Science China Life Sciences*, 57, 327-335.
12. Messaoudi, M., Lalonde, R., Violle, N., Javelot, H., Desor, D., Nejd, A., ... & Cazaubiel, J. M. (2011). Assessment of psychotropic-like properties of a probiotic formulation (*Lactobacillus helveticus* R0052 and *Bifidobacterium longum* R0175) in rats and human subjects. *British Journal of Nutrition*, 105(5), 755-764.