

REVIEW

The effects of probiotics on overall health: a narrative review

O. Oral¹, Z. Rezaee², P. Tatlibal³, P. Thapa⁴, G.N. Nomikos⁵

¹ Ege University, Faculty of Sports Sciences, Department of Health Sciences and Sports, Izmir, Turkey, ² Department of Exercise Physiology, Ferdowsi University of Mashhad, Mashhad, Iran, ³ Dokuz Eylül University, Necat Hepkon Faculty of Sports Sciences, Izmir, Turkey, ⁴ Life Skill Education Institutes/Yeti Health Science Academy, Nepal, ⁵ Chios Hospital, Department of Orthopedic Surgery, Chios, Greece

ABSTRACT

Background: In this study, the positive contributions of consuming the foods rich in probiotics on overall health are emphasized.

Materials and Methods: In the search for scientific literature for this review, data from the US National Library of Medicine (PubMed), MEDLINE, and SportDiscus were used, and the terms “probiotics”, “psychological health”, “anti-inflammatory cytokines”, “gut bacteria”, and “overall health” were used. The relevant literature has also taken its source from the research of relevant articles from reference lists derived from data searches.

Results: In the same way that probiotics have been shown to alleviate the symptoms associated with some gastrointestinal disorders, they have also been shown to boost immune function and reduce the risk of infection. Personalised microbiome interventions and targeted therapies may offer new approaches to healthcare practice as research in this area advances.

Conclusion: Since probiotics help to maintain a healthy balance of gut bacteria, including foods rich in probiotics as part of a healthy lifestyle, they have a positive effect on digestive health and immune function.

Keywords: probiotics, psychological health, gut bacteria, anti-inflammatory cytokines, overall health

O. Oral, Z. Rezaee, P. Tatlibal, P. Thapa, G.N. Nomikos. **The effects of probiotics on overall health: a narrative review.** *Scientific Chronicles* 2024; 29(2): 229-234

INTRODUCTION

Probiotics are microscopic organisms that have a beneficial effect on the health of their host. Probiotics are a type of microorganism that the human body uses to keep itself healthy. They are beneficial bacteria that are needed in the body's system. Most probiotics are commensal bacteria that live in

the flora of the human gut and protect it from various diseases [1,2]. They help maintain healthy body systems and control pathogenic microorganisms such as microbes. The effect of probiotics is to restore the balance of the intestinal flora and when it is used correctly, probiotics can help digest and absorb nutrients. They can be found in fermented foods, cultured milk, and probiotic

supplements. There is strong evidence that the composition and metabolic effects of the gastrointestinal microflora are critical to human health [3,4].

The positive contribution of probiotics to health has been emphasized, and probiotic consumption has been associated with numerous health benefits [5-7]. For example, probiotics have been shown to help maintain a healthy balance of bacteria in the intestines by inhibiting the growth or colonization of harmful bacteria. Improving digestive health is one area where probiotics have shown significant benefits. Research has shown that consuming certain strains of probiotic bacteria can reduce symptoms associated with gastrointestinal disorders such as irritable bowel syndrome (IBS) and inflammatory bowel disease (IBD) [8-10]. In addition, some scientific publications suggest that certain strains of probiotics may help relieve symptoms associated with digestive disorders, such as bloating, gas, and diarrhea. For example, recent clinical trials have found evidence to support the use of certain *Lactobacillus* species to relieve symptoms of irritable bowel syndrome (IBS) [11,12]. However, the use of probiotics for health purposes still presents some challenges. In particular, as different probiotic strains may differ in efficacy, it is of great importance to identify the most effective strains for specific health outcomes [13,14].

DISCUSSION

Recent studies suggest that probiotics may have potential benefits beyond gastrointestinal health, in addition to relieving IBS symptoms [15,16]. These potential benefits

include improving the function of the immune system by increasing the mucosal defence against pathogens, supporting brain health by modulating neurotransmitters such as serotonin, and influencing skin conditions such as eczema by altering the local immune response [17,18]. The health benefits of probiotics may be clarified by a full understanding of these potential benefits and their underlying mechanisms.

Probiotics have been also extensively researched for their anti-inflammatory and analgesic properties. There is evidence that probiotics can eliminate toxin receptors, repair hyperpermeable epithelial barriers, fight against infections, and strengthen the immune system. According to Nazemian et al, probiotics have been shown to significantly influence cytokine and opioid receptor expression [19,20]. Probiotics can help differentiate and activate immune cells. It is during this period that anti-inflammatory cytokines and mu-opioid receptors are up-regulated, while pro-inflammatory cytokines are down-regulated [21,22].

In many studies, there is a large body of clinical evidence supporting the important role of probiotics in the relief of inflammatory pain. These studies emphasize an additional and important role of probiotics as important modulators of immune system responses, highlighting that probiotics may specifically influence the inflammatory response by affecting the balance of pro- and anti-inflammatory cytokines and mu-opioid receptors (MORs). Furthermore, it is thought that probiotics may act as ligands for innate immune system receptors and directly influence pro-inflammatory pathways [23,24].

The studies conducted a comprehensive review of the existing literature and synthesized findings related to probiotics, general health, and athlete health. The effects of probiotics on immune markers, gastrointestinal health, and inflammation in athletes are very important for athlete health. The article investigates the impact of probiotics on immune function, inflammation, and exercise performance in athletes [25]. The study aims to provide insights into the potential benefits of probiotic supplementation for optimizing athlete health and performance. Also, a comprehensive review of the relationship between endurance exercise and the gut microbiota is presented in the article [26]. The study aims to explore the effects of endurance exercise on gut microbiota composition and function, and the potential impact on the health and performance of athletes.

CONCLUSION

A probiotic is defined as a live microbial agent that, when ingested at an appropriate level, provides health benefits to the host. Although the concept of probiotics has been known for centuries, research intensified in recent years has shed light on the potential role of probiotics in healthy living and nutritional health. Various foods, such as yogurt, kefir, and sauerkraut, and various foods, such as probiotics from rich probiotic sources, show their effects primarily by affecting the composition and function of intestinal bacteria that play an important role in maintaining overall health. There is no recommended daily intake of probiotics, which are important for a healthy diet, so it is recommended to include as many fermented foods in the daily diet as

possible, although there is uncertainty about which fermented foods and how much is best.

Probiotics have been shown to help maintain a healthy balance of bacteria in the intestines by inhibiting the growth or colonization of harmful bacteria. Improving digestive health is one area where probiotics have shown significant benefits. In addition to their effects on digestion, probiotics have a positive effect on immune system functions and make a very positive contribution to the health of life. As is known, the intestines harbor a large proportion of immune cells; therefore, maintaining a healthy gut microbiota in a healthy balance is crucial for a strong immune response against pathogens. Since the microbiota is a system that plays significant roles in the digestion of food, support of the immune system, production of certain vitamins, gut health, prevention of inflammation, weight control, cognitive functions, etc., it has been found that maintaining and preserving a healthy gut microbiota can have a very positive effect on general health conditions. Numerous studies have reported that regular consumption of certain probiotic bacteria strains or combinations can enhance immune function and reduce the risk of infection in individuals. The general conclusions of all this scientific research are considered promising for the contributions that probiotics can provide for a healthy life.

To sum up, incorporating probiotic-rich foods into a healthy lifestyle can help improve digestive health and immune function. Probiotics have been shown to contribute to maintaining a healthy balance of gut bacteria and, if used regularly, to alleviate symptoms associated with disorders of the

gastrointestinal (stomach and intestinal) system. They should also be considered as an important contribution to a healthy lifestyle, as they can boost immune function and reduce the risk of disease. It is important to include probiotic products regularly in the daily diet. In this way, probiotics can support targeted therapies and make a significant contribution to overall health.

Acknowledgment:

We would like to express our special thanks to Evangelia STAVROPOULOU for her very successful contribution to the literature research process and unique academic support in the publication during the process of this review article.

Conflict of interest:

The author certifies that there is no conflict of interest with any financial organization regarding the material discussed in the manuscript.

Funding:

The author certifies that there is no funding from any financial organization regarding the material discussed in the manuscript or contributions:

Author contributions:

All the authors read and approved the final version of the manuscript.

REFERENCES

1. Martín R, Miquel S, Ulmer J, Kechaou N, Langella P, Bermúdez-Humarán LG. Role of commensal and probiotic bacteria in human health: a focus on inflammatory bowel disease. *Microb Cell Fact.* 2013 Jul 23;12:71.
2. Gupta V, Garg R. Probiotics. *Indian J Med Microbiol.* 2009 Jul-Sep;27(3):202-9.
3. Floch MH. Probiotics, Irritable Bowel Syndrome, and Inflammatory Bowel Disease. *Curr Treat Options Gastroenterol.* 2003 Aug;6(4):283-288.
4. Mckinley MC. The nutrition and health benefits of yoghurt. *International journal of dairy technology,* 2005;58.1: 1-12.
5. Kechagia M, Basoulis D, Konstantopoulou S, Dimitriadi D, Gyftopoulou K, Skarmoutsou N, Fakiri EM. Health benefits of probiotics: a review. *ISRN Nutr.* 2013 Jan 2;2013:481651.
6. Damián MR, Cortes-Perez NG, Quintana ET, Ortiz-Moreno A, Garfias Noguez C, Cruceño-Casarrubias CE, Sánchez Pardo ME, Bermúdez-Humarán LG. Functional Foods, Nutraceuticals and Probiotics: A Focus on Human Health. *Microorganisms.* 2022 May 21;10(5):1065.
7. Sachdeva V, Roy A, Bharadvaja N. Current Prospects of Nutraceuticals: A Review. *Curr Pharm Biotechnol.* 2020;21(10):884-896.
8. Haller D, Antoine JM, Bengmark S, Enck P, Rijkers GT, Lenoir-Wijnkoop I. Guidance for substantiating the evidence for beneficial effects of probiotics: probiotics in chronic inflammatory

- bowel disease and the functional disorder irritable bowel syndrome. *J Nutr.* 2010 Mar;140(3):690S-7S.
9. Saez-Lara MJ, Gomez-Llorente C, Plaza-Diaz J, Gil A. The role of probiotic lactic acid bacteria and bifidobacteria in the prevention and treatment of inflammatory bowel disease and other related diseases: a systematic review of randomized human clinical trials. *Biomed Res Int.* 2015;2015:505878.
 10. Whelan K, Quigley EM. Probiotics in the management of irritable bowel syndrome and inflammatory bowel disease. *Curr Opin Gastroenterol.* 2013 Mar;29(2):184-9.
 11. Lewis ED, Antony JM, Crowley DC, Piano A, Bhardwaj R, Tompkins TA, Evans M. Efficacy of *Lactobacillus paracasei* HA-196 and *Bifidobacterium longum* R0175 in Alleviating Symptoms of Irritable Bowel Syndrome (IBS): A Randomized, Placebo-Controlled Study. *Nutrients.* 2020 Apr 21;12(4):1159.
 12. Clarke G, Cryan JF, Dinan TG, Quigley EM. Review article: probiotics for the treatment of irritable bowel syndrome--focus on lactic acid bacteria. *Aliment Pharmacol Ther.* 2012 Feb;35(4):403-13.
 13. Sanders ME, Merenstein D, Merrifield CA, Hutkins R. Probiotics for human use. *Nutrition bulletin,* 2018;43(3), 212-225.
 14. Jäger R, Mohr AE, Carpenter KC, Kerksick CM, Purpura M, Moussa A, Townsend JR, Lamprecht M, West NP, Black K, Gleeson M, Pyne DB, Wells SD, Arent SM, Smith-Ryan AE, Kreider RB, Campbell BI, Bannock L, Scheiman J, Wissent CJ, Pane M, Kalman DS, Pugh JN, Ter Haar JA, Antonio J. International Society of Sports Nutrition Position Stand: Probiotics. *J Int Soc Sports Nutr.* 2019 Dec 21;16(1):62.
 15. Collado MC, Isolauri E, Salminen S, Sanz Y. The impact of probiotic on gut health. *Curr Drug Metab.* 2009 Jan;10(1):68-78.
 16. Dupont HL. Review article: evidence for the role of gut microbiota in irritable bowel syndrome and its potential influence on therapeutic targets. *Aliment Pharmacol Ther.* 2014 May;39(10):1033-42.
 17. Chen G, Chen ZM, Fan XY, Jin YL, Li X, Wu SR, Ge WW, Lv CH, Wang YK, Chen JG. Gut-Brain-Skin Axis in Psoriasis: A Review. *Dermatol Ther (Heidelb).* 2021 Feb;11(1):25-38.
 18. Salem I, Ramser A, Isham N, Ghannoum MA. The Gut Microbiome as a Major Regulator of the Gut-Skin Axis. *Front Microbiol.* 2018 Jul 10;9:1459.
 19. Nazemian V, Shadnoush M, Manaheji H, Zaringhalam J. Probiotics and inflammatory pain: a literature review study. *Middle East Journal of Rehabilitation and Health,* 2016;3(2).

20. Shadnoush M, Nazemian V, Manaheji H, Zaringhalam J. Effect of probiotic administration on acute inflammatory pain. *Middle East Journal of Rehabilitation and Health*, 2017;4(1)..
21. Cristofori F, Dargenio VN, Dargenio C, Miniello VL, Barone M, Francavilla R. Anti-Inflammatory and Immunomodulatory Effects of Probiotics in Gut Inflammation: A Door to the Body. *Front Immunol*. 2021 Feb 26;12:578386.
22. Kaur H, Ali SA. Probiotics and gut microbiota: mechanistic insights into gut immune homeostasis through TLR pathway regulation. *Food Funct*. 2022 Jul 18;13(14):7423-7447.
23. Ng SC, Hart AL, Kamm MA, Stagg AJ, Knight SC. Mechanisms of action of probiotics: recent advances. *Inflamm Bowel Dis*. 2009 Feb;15(2):300-10.
24. Pineda Mde L, Thompson SF, Summers K, de Leon F, Pope J, Reid G. A randomized, double-blinded, placebo-controlled pilot study of probiotics in active rheumatoid arthritis. *Med Sci Monit*. 2011 Jun;17(6):CR347-54.
25. West NP, Pyne DB, Peake JM, Cripps AW. Probiotics, immunity and exercise: a review. *Exerc Immunol Rev*, 2009;15(107), e26.
26. Mach, N., & Fuster-Botella, D. (2017). Endurance exercise and gut microbiota: A review. *Journal of sport and health science*, 6(2), 179-197.