

IMMUNOMODULATORY EFFECTS OF PROBIOTICS: POTENTIAL FOR PREVENTING ACUTE RESPIRATORY INFECTIONS IN CHILDREN

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Abstract

Currently, acute respiratory infections (ARI) are a significant pathology of childhood (they account for up to 90% of all cases of acute respiratory tract infections). The effectiveness of probiotics in various diseases has been proven, however, the possibilities of using probiotics as a preventive agent and a method of increasing the body's anti-infectious resistance in acute respiratory infections are becoming increasingly important. In numerous clinical studies involving children, it was found that probiotics contributed to a reduction in the number of cases of acute respiratory infections, a decrease in the average duration of an episode of acute respiratory infections and the frequency of antibiotic use, as well as a decrease in the number of missed classes in preschool/school related to colds. Careful selection of probiotic strains, taking into account their safety for the human body and good tolerability, the multidirectional and physiological action of probiotics contributed to the appearance on the market of a number of probiotics with proven clinical efficacy. This article presents the basic information confirming the effectiveness of the use of *Lactobacillus plantarum* No. 7315/7316 in clinical practice.

Keywords: Probiotic, prevention, *Lactobacillus plantarum*, children, microbiot, immunity.

Introduction

In recent years, interest in the use of probiotics in clinical practice has increased significantly - mainly due to their proven properties, which have a positive effect on human health in general and the immune system in particular. According to the definition given by the World Gastroenterology Organization, probiotics are live microorganisms that, when consumed in adequate amounts, have a beneficial effect on human health, which is confirmed by clinical studies. The most commonly used probiotic bacteria belong to the *Lactobacillus* and *Bifidobacterium* species, as well as *Saccharomyces boulardii* yeast, etc. are also used. Probiotics can be produced in the form of medicines, biologically active additives, functional food products.

These forms allow people to take probiotics in a convenient form and use them to improve their health. The following requirements are imposed on probiotic strains: maintaining viability during passage through the gastrointestinal tract (GIT); the ability to adhere to the epithelium of the intestinal mucosa; the ability to synthesize antimicrobial substances active against pathogenic microorganisms; safety when used in humans; bacterial cell count of at least 10^9 CFU / ml; simple storage methods; clinically proven health benefits.



Probiotics can be divided into 5 groups (generations) according to the time of their appearance in medical practice:

Generation I - probiotics containing a single strain of bacteria;

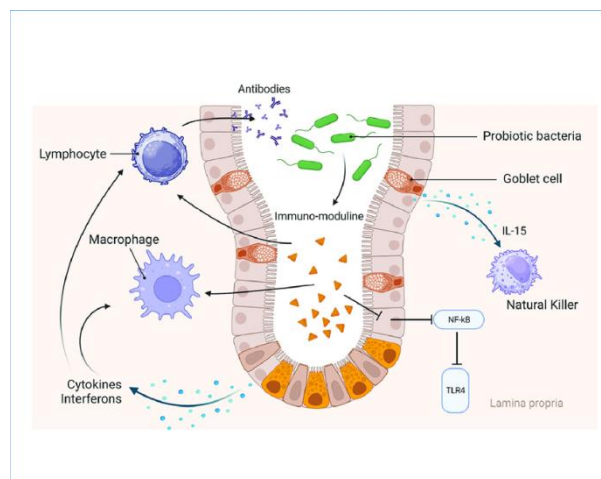
Generation II - probiotics based on the use of microorganisms that are not specific for the human body, which are self-destructive antagonists of pathogens;

Generation III - polystrain probiotics containing several symbiotic strains of bacteria of the same or different types, having a mutually reinforcing effect;

Generation IV - preparations containing bifids immobilized on a sorbent, the protective effect of which is much higher than that of unabsorbed analogues;

Generation V - specialized probiotics of targeted action with differential indications for use. An example of a fifth-generation probiotic with targeted action is the immunobiotic (i.e., Probiotic complex for maintaining immunity) Bifistim® immuno (AB Biotics, Spain).

The effect of probiotics on the human body occurs through various molecular biological mechanisms that are carried out in three main directions:



1. General effects (synthesis of nutrients and antioxidants, activation of mucosal immunity, modulation of the Th1/Th2 response, control of potentially pathogenic microorganisms, reduction of endotoxin production and mutagenicity);
2. Humoral effects (reduction of IgE synthesis, stimulation of IgA and NO production, modulation of the cytokine response);
3. Cellular effects (activation of macrophages, stimulation of cell growth and renewal, support of physiological apoptosis).

Participation of probiotics in the modulation of the immune response occurs through interaction with many cells of the immune system of the gastrointestinal tract, which helps to correct microbiological and immunological diseases. It is known that the lymphoid tissues of the intestinal mucosa (Peyer's patches, appendix, lymph nodes and individual cells - lymphocytes, macrophages, mast cells, etc.) are involved in the implementation of immune responses in the gastrointestinal tract. Immunocompetent cells play a key role in modulating the immune response by activating Toll-like receptors (TLRs), which recognize pathogenic structures such as lipopolysaccharides and



peptidoglycans. This triggers a cascade of reactions that leads to increased production of secretory IgA and the production of various cytokines and interferons, which strengthens the body's defense mechanisms. In addition, interstitial microbiota and intestinal epithelial cells (IEH) actively interact with each other. Microbiota activates IEH and intestinal immune cells, resulting in the synthesis of secretory IgA and the activation of protective factors such as lysozyme, properdin, and the complement system .

These interactions stimulate the production of interferon and cytokines, which enhances the overall immune response. The microbiota not only activates immune responses in the gastrointestinal tract, but also affects the immune response in the respiratory system, which emphasizes the importance of the microbiota in maintaining overall immune homeostasis. *Lactobacillus* spp. are widely used in clinical practice. - Gram-positive, non-spore-forming facultative anaerobic bacteria, which have many strains that have a positive effect on human health. This group of probiotics includes *Lactobacillus plantarum*, which is used as a probiotic due to its beneficial effects on human health. *L. plantarum* strains with immunomodulatory properties include strains CECT 7315 and CECT 7316, which have been identified as probiotics by numerous studies, i.e., they meet all the requirements for probiotic strains, which has been confirmed in numerous studies. Thus, J. Mañé et al.

The beneficial effects of *L. plantarum* CECT 7315/7316 on human health are manifested by indirect local and systemic immune effects through modulation of the immune system, namely by an increase in the number of B lymphocytes, natural killers and antigen-presenting cells, and by increased activation of CD4+ and CD8+ t cells.

Currently, probiotics are widely used in clinical practice for therapeutic purposes. In particular, probiotics are successfully used for diarrhea of various etiologies (infectious diarrhea, *Clostridium difficile*-associated diarrhea; traveler's diarrhea), as well as for gastrointestinal diseases - *Helicobacter* infection, Crohn's disease, necrotic enterocolitis of premature infants. The effectiveness of prescribing probiotics for antibiotic-associated syndrome in children receiving systemic antibiotic therapy for lower respiratory tract infections has been shown; The use of probiotics in healthy women without psychiatric or gastroenterological pathologies has been shown to increase brain activity when used for the prevention and/or treatment of allergic diseases, urogenital tract infections. Thus, the therapeutic and prophylactic potential of widely used probiotics will continue to be studied in the near future.

The most relevant area of application of probiotics is the treatment of common infectious diseases (acute respiratory infections (ARI) affecting the upper respiratory tract), which have been leading in the structure of infectious pathology for more than ten years. They are especially relevant for young children, as the most vulnerable group of patients. The importance of ARI is associated with economic damage caused by direct and indirect costs. Probiotic drugs are used in children and adults to reduce the number, duration and severity of ARI episodes. Currently, doctors have in their arsenal a targeted Probiotic of the V generation, immunobiotic Bifistim® immuno, which contains two strains of lactobacilli, *L. plantarum* CECT7315 and *L. plantarum* CECT7316, as well as ascorbic acid (vitamin C), zinc sulfate, retinol acetate (vitamin A), pyridoxine hydrochloride (vitamin B6), folic acid (vitamin B9), sodium selenite, cyanocobalamin (vitamin B12). The unique combination of probiotic ingredients has a clinically proven ability to positively affect the immune system.



Thus, the study of various strains of microorganisms used as probiotics and the possibilities of their use continues. The recommended dosages may vary depending on the characteristics of the effects they exert. The available data allow us to speak about the ability of probiotics, in particular Bifistim® immuno, to ensure the effective functioning of the immune system, to prevent the development of infectious and inflammatory diseases in school-age children and adults.

References

1. Ardatskaya M. D. klinik amaliyotda probiotiklar, prebiotiklar va metabiotiklar: shifokorlar uchun qo'llanma. M.: Geotar-Media; 2024.Ardatskaya M.D. Probiotics, prebiotics and metabiotics in clinical practice: a guide for doctors. M.: GEOTAR-Media; 2024 (in Russ.).
2. De Moreno De LeBlanc A., Chaves S., Carmuega E. et al. Effect of long-term continuous consumption of fermented milk containing probiotic bacteria on mucosal immunity and the activity of peritoneal macrophages. *Immunobiology*. 2008;213(2):97–108. DOI: 10.1016/j.imbio.2007.07.002.
3. Reid G., Burton J. Use of *Lactobacillus* to prevent infection by pathogenic bacteria. *Microbes Infect*. 2002;4(3):319–324. DOI: 10.1016/s1286-4579(02)01544-7.
4. Martinez V., López Q., Gassull M.A. et al. Strains of *Lactobacillus plantarum* as probiotics. *European Patent*. 2007; 07121817.6.
5. Mañé J., Pedrosa E., Lorén V. va boshq. *Lactobacillus plantarum* cect 7315 va CECT 7316 aralashmasi keksa odamlarda tizimli immunitetni oshiradi. Dozaga javob, ikki tomonlama ko'r, platsebo nazorati ostida, randomizatsiyalangan sinov. *Nutr Hosp*. 2011;26(1):228-235.
6. Bosch M., Rodriguez M., Garcia F. va boshq. *Lactobacillus plantarum* cect 7315 va cect 7316 ning Probiotik xususiyatlari sog'lom bolalar najasidan ajratilgan. *Latish Appl Microbiol*. 2012;54(3):240–246. DOI: 10.1111 / j.1472-765X.2011.03199.x.
7. Pedone C. A., Arnaud C. C., Postaire E. R. va boshq. *Laktobacillus casei* tomonidan fermentlangan sutning diareya bilan kasallanishiga ta'sirini ko'p markazli o'rganish. *Int J Clin Pract*. 2000;54(9):568–571. PMID: 11220983.
8. Gotz V., Romankevich J. A., Moss J., Myurrey X. V. *laktobasillus* preparati bilan ampitsillin bilan bog'liq diareyaga qarshi profilaktika. *Am J Hosp Farm*. 1979;36(6):754–757. PMID: 111546.

