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Probiotics and prebiotics - characteristics and application among children and adolescents

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Introduction

Dietary supplements containing live microorganisms and nutrients that support the human body are used with ever increasing frequency by parents among children and adolescents. Preparations available on the market have a diverse composition, which may be problematic when deciding which product to choose and in which disease entity to use it. The purpose of the articles is to approximate the characteristics of probiotics and prebiotics and determine the indications for their use.

Probiotics- definition and characteristics

Probiotics are live microorganisms administered to the host to achieve the desired beneficial health effect. The genus, species and probiotic strain are commonly used to characterise the bacteria. Identification based on the numerical and digital sign next to the name of the microorganism indicates the collection of microorganisms in which the reference strain is stored.

Characteristics – example:

Lactobacillus reuteri DSM 17938
Type*: Lactobacillus*
Species: *reuteri*
Name and number of the collection in which the strain is stored: DSM 17938
DSM - Deutsche Sammlung von Mikroorganismen und Zellkulturen

In terms of safety and guarantees of the best-studied bacteria, products with full strain characteristics, the indicated number of live bacteria at the end of shelf-life and dosage should be selected. It is also suggested that the type of carrier / matrix used may affect the viability of the

strain and its properties. The majority of preparations are dietary supplements or dietary foods for special use; only a small number of probiotics are medicinal products. In the dairy industry, probiotics can be added to fermented products such as yoghurts and kefirs. It should be borne in mind that the quality of preparations registered as a drug or pharmaceutical preparation is better than dietary supplements due to the legal conditions of stricter controls.

Microbiota

An important concept used for research on probiotics is the term "microbiota". This term defines the totality of bacteria, eukaryotic organisms and viruses inhabiting the human digestive tract. Some authors define microbiota as an additional organ, in metabolic terms compared even with the liver. The term dysbiosis, which means disorders in the composition of microorganisms, may be the cause of many diseases such as inflammatory bowel disease, irritable bowel syndrome, allergic diseases or obesity.

Mechanism of action

The mechanism of action of probiotics may vary depending on the different bacterial strain. However, it is most frequently based on:
- protection against colonisation of unfavourable microorganisms,
- production of short-chain fatty acids that support intestinal transit, stabilisation of intestinal microbiota,
- competition with pathogenic micro-organisms,
- production of vitamins,
- metabolism of bile salts,
- enzymatic activity
- neutralisation of carcinogens.

The most commonly used probiotics are bacteria producing lactic acid from the genus *Lactobacillus* and *Bifidobacterium*.

Indications of use

The use of probiotics in children has been confirmed in two indications:
- Acute infectious diarrhoea - as adjuvant treatment with irrigation. It is recommended to administer *Lactobacillus GG, S. boulardii* and *L. reuteri* DSM 17 938. This procedure reduces the duration of symptoms by an average of 24 hours.
- Prevention of diarrhoea associated with the use of an antibiotic - any antibiotic therapy can cause diarrhoea, but it most often occurs with the use of antibiotics with a broad spectrum of activity: aminopenicillin, aminopenicillin with clavulanic acid, clindamycin and some cephalosporins. In order to reduce the risk of complications of antibiotic therapy, *Lactobacillus GG* or *S. boulardii* should be used.

The use of probiotics may in the future be justified in other disease entities. However, further research is needed to formulate guidelines, due to conflicting information or insufficient quantities.
Indecisive indications:

• hospital diarrhoea
• prevention of infections in pre-school and nursery children
• prevention of atopic dermatitis
• baby colic
• functional constipation
• irritable bowel syndrome
and others.

Probiotics available in Poland with documented effects

Probiotics	Indications for use
Lactobacillus rhamnosus	Treatment of acute diarrhoea, prevention of diarrhoea associated with antibiotic therapy, prevention of hospital diarrhoea
Lactobacillus reuteri DSM 17 938	Treatment of acute diarrhoeal infections, infantile colic
Saccharomyces boulardii	Treatment of acute diarrhoea, prevention of diarrhoea associated with the use of antibiotics

Prebiotics

Prebiotics are substances that are designed to selectively stimulate the development and / or activity of one or a certain number of bacterial strains in the large intestine, which positively affects the state of human health. These substances are not digestible and come from food.

Prebiotics are resistant to the action of digestive enzymes but are easily hydrolysed or fermented in the large intestine. It is believed that these substances should stimulate the growth of bacteria of the genus *Bifidobacterium* and *Lactobacillus*.

Naturally occurring prebiotics are non-digestible carbohydrates, most commonly fructans: inulin and fructooligosaccharides (FOS) and galactooligosaccharides (GOS). Fermenting oligo-, di- and monosaccharides as well as polyols are also considered to be prebiotics. These substances are found in many fruits, vegetables, cereal products and in human milk. According to available clinically proven data, there is no reason to use any of the prebiotics to treat or prevent diseases in children.

Safety of use

Probiotics are generally considered to be safe. On the basis of several publications it has been determined that the risk of bacterial infection is negligible. However, given the current state of knowledge, it should be taken with caution in the following cases, and only when the application is justified: preterm infants; immunodeficient patients; seriously ill patients in ICU with a catheter leading to large veins.

Conclusions

The use of probiotics / prebiotics is considered by many as justified and helpful, but only if the product is well-tested and contains a probiotic and / or prebiotic with a documented effect in the treatment or prevention of a given disease entity. When deciding to use probiotics and / or prebiotics in therapy, it is always worth analysing the benefits (eg duration of the disease,

preventing complications of treatment, ease and safety of use) and losses (eg costs, unconfirmed indications) of using these preparations. The lack of clinical trials often does not mean that a given probiotic and / or prebiotic is ineffective but that there is no scientific basis for its use.

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