Probiotics in gynaecology

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S u m m a r y

Probiotics are the bacterial strains living and reproducing in the gastrointestinal tract. They favorably influence human organism by maintaing the balance of intestinal microflora and vaginal biocenosis. Recently, the interest in probiotics bacteria has increased. They are used not only in prophylaxis, but also in treatment, especially in infectious diseases of gastrointestinal and genitourinary tracts.

Key words: *probiotics, Lactobacillus, bacterial vaginosis, probiotics bacteria*

INTRODUCTION

The word: probiotics comes from Greek *pro bios* (for life) and was introduced in 1965 to name favourable microorganism which can substitute pathogens in gastrointestinal tract. According to the definition of Fuller (1989), they are vivid microorganism being the ingredient of food, influencing favorably the human organism by improvement of intestinal microflora [1-3]. Delzenne and Roberfroid characterize probiotic food as enriched with microorganism in form and quantity able to survive in gastrointestinal tract (mainly stomach and duodenum), and subsequently inhabit colon and especially duodenum, still being active. According to criteria of WHO/FAO, only bacterial strains able to survive and reproduce in gastrointestinal tract strains, able to colonize whole gastrointestinal tract, which can be identified by means of the molecular biology techniques and their favourable

influence on the human health has been clinically proved can be described as probiotics [1, 4]. The other requirements regarding probiotics strains are: safety of administration, lack of toxic metabolic products, possibility of isolation form human organism, resistance to technological processes, meaning the adequate survival and activity, adherence to intestinal mucosa, antagonistic activity against pathogenic microorganism and the stimulation of immune system [5, 6].

PROBIOTICS AND PREBIOTICS

Along with probiotics, frequently prebiotics appear – food components that do not influence the digestion process but activate the growth or activity of selected bacterial intestinal strains. They also favourable change the microflora of the host organism, afecting the improvement of health. However, *symbiotic* means the food product which containing probiotics and prebiotics. Recently the interest of so-called *functional food* is growing, which means the food products, with harmful components removed or enriched with active physiological substances in order to improve the nutritional values and favourably influence the organism [1, 7].

PROBIOTICS AND THEIR IMPORTANCE FOR HUMAN

The most important types of strains are *Lactobacillus* and *Bifidobacterium*. Recently, the interest of researchers is focused on *Lactobacillus* GG, variant of *L. casei* sps. *rhamnosus* [1, 4, 5]. Primary germ – free gastrointestinal tract of the newborn is in short time colonized by *Escherichia coli, Enterococcus, Clostridium*, and following *Lactobacillus* and *Bifidobacterium* which tend to dominate. The rich source of probiotics for newborn is breast milk. The composition of the physiological flora of the gastrointestinal tract is most intensively formed in first two years of life. It is assumed, that physiological flora components consists of about 500 microrganism strains, mainly anaerobics [2, 5, 8, 9].

The main tasks of the probiotic flora in gastrointestinal tract are: to preserve against the pathogenic microorganisms colonization, to stimulate regenerative processes of intestinal mucosa, to increase peristalsis, to participate in digestion of some food components, the synthesis of several vitamins (B_1, B_2, B_{12}, K), the inhibition of the cholesterol absorption, the increase of calcium absorption, the anticancerogenic properties and the stimulation of immune system [2, 6].

Recently, the growing interest in probiotics is a result of increasing possibilities to administer them both in prophylactics and therapeutics. The probiotics are proved to be effective in the maintenance of normal composition of intestinal flora as well as in prophylaxis and treatment of infectious diseases of gastrointestinal tract (antibiotics therapy, rotaviruses and bacterial diarrheas). Probiotics diminish the intensification of lactose intolerance, normalize the peristalsis in elderly

people, lower the cholesterol level in blood and act as antagonists to *Heliocobacter pylori*. Other properties of some probiotic strains are: anticancerogenic, suppressive to allergic inflammation and atopic egzema in newborn, the caries prophylaxis, the therapy of chronic, nonspecific enteritis and infections of genitourinary system in women. Probiotics open the brand new therapeutic possibilities but most of them require thorough investigations. Vide number of reports concern the role of probiotics in the maintenance of balance of intestinal microflora as a result of antibiotics therapy and in infectious diarrheas [1, 7].

PROBIOTICS IN GYNECOLOGY

The basic vaginal biocenosis consists of about 100 bacterial strains, aerobic and anaerobic, mainly *Lactobacillus*, which prevents infections. A dynamic balance in the number of separated components of physiological vaginal flora is observed. The disturbance of this balance leads to development of infections in genitourinary tract. Many factors cause vaginal biocenosis: the menstrual cycle phase, age, pregnancy, hormonal and immunological disturbances, infections, drugs (antibiotics therapy), contraception, improper hygiene, chronic diseases, artificial insemination, diet and sexual activity [13, 14, 25].

The main purpose of *Lactobacillus* and other bacteria taking part in regular, normal vaginal biocenosis is maintenance of proper pH of the vagina (3,8–4,2), production of bacteriocins, hydrogen peroxide and lactic acid, to prevent multiplying of pathological flora and stimulation of immunological response in the vagina. Moreover, it was found that they are able to produce biosurfantant and collagen binding proteins which inhibit the adhesion of pathogens to vaginal epithelial cells. The probiotics are capable to adherence to vaginal epithelial cells, and to form the protective layer (biofilm) providing the barrier against pathogens. The most frequent vaginal infections are bacterial vaginosis (BV), candidiasis, and trichomoniasis. Only two strains of *Lactobacillus rhamnosus* GR-1 and *Lactobacillus fermentum* RC-14 comply with WHO/FAO requirements relevant to the efficacy of activity, because they were isolated from the environment of the urinary tract, they show the great affinity to vaginal epithelium, have the capability to colonize the vagina, inhibit the growth of pathogens and reveal the range of the resistance on antibiotics character specific for a given strains [6, 10, 13, 14, 16-20].

BACTERIAL VAGINOSIS

Bacterial vaginosis (BV) is a disorder of the balance of vaginal microflora with regard to anaerobic bacteria, which number may increase 100-fold. This is the most frequent cause of abnormal vaginal discharge in women in reproductive age [13]. The genitourinary infections are a very prevalent problem. The incidence of

infections of urinary bladder and vagina occurs in billion cases a year, which significantly deteriorates the quality of life and moreover, cause additional consequences such as increase of risk of preterm delivery due to chronic bacterial vaginosis. The most important is the prophylaxis of recurrence of these infections. The use of probiotics shows the importance of the prophylaxis of infections in genitourinary tract of women. Currently, there are numerous drugs administered orally and vaginally. It was shown that most of components of natural vaginal flora originate from gastrointestinal tract and can be transmitted from anus. Hence, regular taking of orally administered drugs containing probiotics can normalize the microflora of the vagina essentially diminishing the number of *E. colii* and *Candida albicans*. The efficacy of the vaginally administered drugs was confirmed in bacterial vaginosis and in cases of some pathogens causing the infections of urinary tract [16, 18, 19, 21, 22]. It was also observed that daily consumption of yogurts, containing *Lactobacillus acidophilus* diminish the incidence of *Candida albicans* infections in vagina [23]. The favourable activity of probiotics in the prophylaxis of recurrent infections of urinary tract and bacterial vaginosis was also found in postmenopausal women. In menopausal women the level of estrogens is decreasing, the number of *Lactobacillus* is diminished, and the pH is increasing, what enhance the multiplying of the *Enterobacteriacae* species, frequent cause of infections of the genitourinary tract. The incidence of these infections diminishes along with growing number of *Lactibacilli* observed along with use of hormonal replacement therapy [16. 24].

CONCLUSION

According to newest reports, probiotics are a important tool in the therapeutic procedure and essential component supporting the pharmacological treatment, especially along with rapid increase of antibiotic resistance of the bacteria. The safety and efficacy of application creates more possibilities of their administration. It is essential to know that there are potential side effects of probiotics' effects such as systemic infections, overstimulation of immunological system or genes transfer. Hence, it is a necessity of further investigations in this field. It is also necessary to label the probiotics products precisely. The market's labels should contain the name of the used strain, the number of viable bacteria and the indications for treatment. Many aspects related to the mechanisms of action probiotics' effects yet to be explained and require further clinical trials in order to prove the principles and safety of their application.

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ZASTOSOWANIE PROBIOTYKÓW W GINEKOLOGII

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S t r e s z c z e n i e

Probiotyki to szczepy bakterii, które mają zdolność przeżycia i namnażania się w przewodzie pokarmowym oraz działają korzystnie na organizm człowieka poprzez wpływ na równowagę mikroflory jelitowej i biocenozy pochwy. W ostatnich latach nastąpił wzrost zainteresowania bakteriami probiotycznymi, które oprócz wykorzystania w profilaktyce znajdują zastosowanie w lecznictwie, zwłaszcza w chorobach infekcyjnych przewodu pokarmowego i zakażeniach układu moczowo-płciowego u kobiet.

***Słowa kluczowe**: probiotyki, Lactobacillus, bakteryjne i grzybicze zapalenie pochwy, bakterie probiotyczne*