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Short review

Clinical importance of lactic acid bacteria: a short review

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Abstract. Lactic acid bacteria (LAB) were used extensively as starter cultures in food fermentation. Some of the health benefits which have been claimed for lactic acid bacteria as probiotics include the following: improvement of the normal microflora, prevention of infectious diseases and food allergies, reduction of serum cholesterol, anticarcinogenic activity, stabilization of the gut mucosal barrier, immune adjuvant properties, alleviation of intestinal bowel disease symptoms and improvement in the digestion of lactose in intolerant hosts. The present study is aimed to brief review the some clinical importance of lactic acid bacteria (www.actabiomedica.it)

Key words: lactic acid bacteria, probiotics, gastrointestinal tract, diarrhea

Introduction

Probiotics are defined as "living microorganisms" that confer a health benefit on the host (FAO/WHO, 2002) and they have been mostly studied in the prevention and treatment of gastrointestinal disorders (1). Lactic acid bacteria (LAB), especially Lactobacillus spp. and Bifidobacterium spp. are important GIT residents and are used as probiotic strains to improve health (2, 3). Lactobacillus and Bifidobacterium have been used in fermented foods for several centuries without adverse effects (4) and are classified as Generally Recognized as Safe (GRAS) because of their long history of safe use, particularly in dairy foods (5).

Literature survey reveals beneficial potentials of lactic acid bacteria in various ways like lowering cholesterol levels, improving immune system, balancing gut micro flora and preventing constipation, diarrhea and bloating, preventing fungal infection and improving digestibility of food constituents and improves immune response and anticarcinogenic activity (6). The immunological potentials of *Lactobacillus acidophilus* (LAB) have raised a lot of interest in recent years due to their immunestimulating properties.

Probiotic bacteria interact with three components of the gastrointestinal tract including intestinal epithelial cells, luminal flora, and the mucosal immune cells. Yogurt containing LAB plays critical role on the immune system and the ability to fight off an infection (7). In general, probiotic bacteria must colonize the gastrointestinal tract (GIT) of the host, have acid- and bile salt-tolerance, and block putrefactive bacteria in the GIT.

Effect of Lactic Acid Bacteria on Diarrheal Diseases

Diarrhea means the increased liquidity or decreased consistency of stools usually associated with an increased frequency of stools and an increased fecal weight. The WHO defines diarrhea as 3 or more wa-

tery stools on 2 or more consecutive days. Treatment of diarrhea by administering living or dried bacteria to restore a disturbed intestinal microflora has a long tradition. Lactic acid bacteria is useful in preventing and shortening the duration of several types of diarrhea (8). A number of well-designed studies have noted that fermented milk products effectively prevent or treat infantile diarrhea (9). Effects have been noted with *L. casei* and *B. bifidum.* A few small studies show that lactic acid bacteria can reduce the incidence of antibiotic-related diarrhea (10, 11).This suggests a role for lactic acid bacteria in immunosuppressed patients who routinely use antibiotics **(**12**)**. A few studies of traveller's diarrhea have demonstrated the effectiveness of lactic acid bacteria in decreasing the incidence of diarrhea (13).

Role in immunity improvement

Lactobacillus spp. Lactobacillus (acidophilus, casei, plantarum, delbrueckii, gasseri) and *Bifidobacterium (longum, bifidum, adolescentis, infantis)* these all lactic acid bacteria produce certain bioactive peptides, which stimulate the proliferation and maturation of T lymphocytes and improve immunity by increasing the number of IgA through producing plasma cells (14). Moreover, muramyl dipeptide, a low molecular weight product of the peptidoglycans, which stimulates production of pro and anti inflammatory cytokine by macrophages, monocytes and lymphocytes (15). Yogurt containing lactic acid bacteria induce adjuvant activity at the mucosal surface and improve phagocytosis by increasing the proportion of lymphocytes and natural killer cells (16). Moreover, monocytes play critical roles in the induction of cytokines following the augmentation of NK cell activity during the stimulation of human peripheral blood mononuclear cells with *L. casei* strain Shirota (17). Yogurt, stimulate the production of teichoic acid, which reduces IgE-mediated disorders and liberates low molecular weight peptides in gastrointestinal tract, that trigger the immune system and produce conjugated linoleic Acid, which has immunomodulatory and anticarcinogenic activity (15). Yogurt, produce conjugated linoleic acid, which has immunomodulatory activity (16).

Antitumor, antimutagenic and anticarcinogenic activity

Currently, one of the most important factors in human longevity is the control of tumors. Therefore, studies on the beneficial effects of lactic acid bacteria have been largely focused on their antitumor effects. A variety of lactic acid bacteria have been previously reported as displaying antitumor, antimutagenic and anticancer activity.

Lactic acid bacteria and inhibition of the tumor growth many healthful effects have been attributed to the lactic acid bacteria. Bacterial products from *Lactobacillus bulgaricus, Lactobacillus acidophilus* and other lactic organisms produce antimicrobial substances and natural antibiotics are not well studied (18). Consumption of milk products containing such natural antibacterial substances may provide the consumer with protection against disease organisms (19). Specific strains of lactic acid bacteria used to ferment milk are promising candidates that may be antimutagenic and anticarcinogenic. A model of specific reactive oxygen species interaction during lactobacilli-mediated tumor control in the vagina is presented from Bauer (20). This investigation is based on recent evidence on superoxide anion generation by transformed cells and on the potential of myeloperoxidase for selective apoptosis induction in transformed cells. They are plausible candidates for circumvention of lactobacilli-mediated control of oncogenesis. Probiotics and their action derive from many years of tradition in consumption of fermented milk products and the documentation of much research into strains of lactic bacteria, their harmless action on health and overall beneficial effect including antitumor effects too (21). Certain strains of lactic acid bacteria have also been found to be able to prevent putative preneoplastic lesions induced by carcinogens and have antitumor activity (22).

Experimental studies indicate an effect of lactic bacteria on human cell cancer lines but clinical evidence is lacking (23). Although a numerous health-promoting effects have been attributed to the probiotic lactic acid bacteria, perhaps the most interesting and controversial is that of anticancer activity, the vast majority of studies in this area dealing with protective ef-

fects against colon cancer. Evidence for cancer suppression in humans as a result of the consumption of probiotic cultures in fermented or unfermented dairy products but there is a wealth of indirect evidence, based largely on laboratory studies.

Cardiovascular disease

Cardiovascular disease is the most important cause of death in westernized countries, including Korea. In the United States, 10 million people suffer from ischemic coronary arterial diseases, and spend 115 billion dollars per year to treat it (24). According to NHANES (the third national health and nation examination survey) data and NCEP (national cholesterol education program) guide, a half million people have died of ischemic cardiac disease (24).

Hypercholesterolemia is strongly associated with coronary heart disease and arteriosclerosis (25), and decreasing serum cholesterol is an important treatment option. HDL-cholesterol can prevent arteriosclerosis by removing cholesterol from the blood stream, whereas LDL-cholesterol causes accumulation of cholesterol in blood vessels (26). According to Frick et al. (27), every 1% reduction in body cholesterol content lowers the risk for cardiovascular diseases by 2%. Therapeutic lifestyle changes including dietary interventions, in particular a reduction of saturated fat and cholesterol, are established as a first line therapy to reduce LDL-cholesterol. A change in dietary habits, such as eating fermented products containing lactic acid bacteria, can reduce cholesterol. Since the early studies of Mann and Spoerry (28), the cholesterol-lowering potential of lactic acid bacteria such as Lactobacillus and Bifidobacterium is commonly studied in vitro or in vivo (experimental animals and human subjects) (29, 30).

Conclusion

In this review we are presenting the beneficial potentials of lactic acid bacteria in context with clinical studies. Probiotics lactic acid bacteria are specific products of microorganisms, and by being biologically active positively they act on stabilizing the bacteriological flora of the gastrointestinal tract. They are live or lyophilized bacterial cultures, especially those derived from lactic fermentation. Probiotics lactic acid bacteria are devoid of side affects and do not cause accumulation of toxic substances in the body.

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