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Review Article
In-vitro Inhibition of *Helicobacter Pylori* by *Lactobacillus casei* Strains

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Abstract

Lactic acid bacteria (LAB) are widely used in the production of fermented foods, beverages and contribute to the sensory qualities and preservation of food and to the prevention of spoilage. *Helicobacter pylori* is a spiral Gram-negative, microaerophilic stomach pathogen that infects over 50% of population worldwide

Introduction

Lactic acid bacteria (LAB) are widely used in the production of fermented foods, beverages and contribute to the sensory qualities and preservation of food and to the prevention of spoilage. Moreover, they are present in large numbers in the normal human and animal gastrointestinal flora (Sgouras *et al*., 2004). Health promoting benefits of consumption of LAB have been known for several years, since Metchnikoff (1908) first longevity of Bulgarian peasants to consumption of fermented milks. The term 'probiotic' was first described by Fuller (1989) as 'a live microbial feed supplement that beneficially affects the host by improving its intestinal microbial balance'. Some of the commonly known probiotics belong to the *Lactobacillus* genus. Strains of *Lactobacillus casei, Lactobacillus rhamnosus, Lactobacillus paracasei* and *Lactobacillus acidophilus* have been identified as possessing probiotic properties, and these strains have been used to treat gastrointestinal diseases.

The human gastrointestinal microflora under normal circumstances is a stable ecosystem in which the microorganisms remain relatively constant. The role of the normal microflora is still poorly understood, but two of the most important functions from the host's point view are to maintain resistance to colonization by infections caused by pathogens and to perform certain metabolic functions. Maintenance of the intestinal ecological flora is important in preventing pathogenic bacteria. Widespread use of antibiotics has not only led to an increase in antibiotic-resistant pathogenic bacteria, but it is often associated with the disruption of the protective flora, leading to predisposition to infections. For these reasons, the control of infections through a non antibiotic approach is urgently needed and bacterial replacement therapy using natural flora is a promising alternative. Probiotic bacteria are live microorganisms which function for the well being of the host. It is accepted that these bacteria might represent effective tools for controlling overgrowth of pathogens and thereby prevent infections. Numerous in vitro and in vivo studies performed with different probiotic bacteria have shown the capabilities of these bacteria to interfere with both growth and virulence properties (Arvola *et al.,* 1999; Cocconnier *et al.,* 1998).

Helicobacter pylori is a spiral Gram-negative, microaerophilic stomach pathogen that infects over 50% of population worldwide (Sgouras *et al.,* 2004). Marshall and Warren (1984) first isolated it in 1984 in gastric biopsy samples from patients suffering from gastritis and peptic ulcers. Following their discovery, investigators all over the world rapidly confirmed the presence of these organisms in the gastric mucus. It is now evident that once acquired, *H. pylori* persists, usually for life, unless eradicated by antimicrobial therapy (Dunn *et al*., 1997). It is a specialised pathogen that has a unique combination of virulence factors, an incomplete citric acid cycle, a simple respiratory chain with only a single terminal oxidase and few regulatory systems (Kelly, 2001). In antral and duodenal biopsy specimens, *H. pylori* has been shown to attach to

epithelial cells and occasionally penetrate the cells (Coconnier *et al*., 1998). Chronic infection with this bacterium has been identified as the major etiological factor in gastritis, gastric ulcers, gastric atrophy, and gastric carcinoma. As a result, in 1994, the International Agency for Research on Cancer (IARC, Lyon, France), classified *H. pylori* infection as a carcinogenic agent class I (Van de Bovenkamp *et al.,* 2003).

Several authors have reported antagonistic activity of *Lactobacillus* against *H. pylori.* Coconnier *et al.* (1998) studied the human *L. acidophilus* strain LB, which secretes an antimicrobial substance and found that the spent culture supernatant of the strain dramatically decreased the viability of *H. pylori* in vitro. The adhesion of *H. pylori* to HT29-MTX cells also decreased as did their viability in the presence of the supernatant. Inhibition of stomach colonization by *H. felis* in conventional mice was also observed by the authors. Sgouras *et al.* (2004) reported in vitro activity against *H. pylori* in the presence of viable *L. casei* shirota cells. Antimicrobial activity of probiotic bacteria has been attributed to the antimicrobial substances released by the organisms. These include several metabolites, organic acids and bacteriocins. Several studies also proposed that lactic acid production by these organisms is responsible for inhibition of *H. pylori* (Midolo et *al*., 1995; Bhatia *et al.*, 1989). There is a growing interest in finding safer, 'side-effect free' ways of treating infections, and probiotic bacteria can play a very important role.

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