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Title: Comparative evaluation of the synbiotic properties derived from the aqueous-alcoholic extract of asparagus, scallion and carbohydrates (inulin and trehalose) as prebiotic compounds together with the probiotic *Lactobacillus salivarius* in laboratory conditions

Abstract

Postbiotics are metabolites produced by probiotic bacteria that have many health effects. The non-toxicity and safety of postbiotics are among the most important characteristics of these compounds for their application in the food industry. Prebiotics are also indigestible and non-degradable food substances that benefit the host by selectively promoting the growth and activity of certain intestinal bacteria. This study aimed to investigate the antioxidant and antibacterial properties of the postbiotic *Lactobacillus salivarius* IBRC-M 10865 alone and in combination with synthetic sugars such as inulin and trehalose, as well as the aqueous-alcoholic extract of the asparagus and scallion plants as a natural prebiotic compound against foodborne pathogens (*Salmonella* typhimurium, *Listeria monocytogenes*, *Staphylococcus aureus*, and *Escherichia coli* $O_{157:}H_7$) in-vitro.The antioxidant properties of the postbiotic and synbiotic compositions were evaluated using two methods: DPPH and FRAP .According to the results obtained, postbiotic *Lactobacillus salivarius* along with herbal extracts showed higher antioxidant activity compared to the control. In this study, the antimicrobial properties of postbiotic *Lactobacillus salivarious* culture in MRS broth, both in the presence and absence of the prebiotics inulin and trehalose, as well as the aqueous-alcoholic extract of *asparagus* and *scallion* plants, were evaluated against foodborne pathogens using the well diffusion method and the minimum inhibitory concentration and bactericidal assays through microdilution.The results showed that postbiotic Lactobacillus salivarius in the presence of 1% scallion reduced the minimum inhibitory concentration for Listeria monocytogenes to 3.125 mg/ml, while the control group was 12.5 mg/ml. Also, the postbiotic Lactobacillus salivarius along with asparagus and scallion at a concentration of 1% halo showed significant growth inhibition against foodborne pathogens. It can be concluded that synbiotic compositions containing *Lactobacillus salivarius* and plant-derived prebiotics can serve as a suitable alternative for preventing the growth of foodborne pathogens.

Keywords: Food-borne pathogen, Pre-biotic, Syn-biotic, Post-biotic, *Lactobacillus Salivarius*