

IN VITRO EVALUATION OF ANTIMICROBIAL ACTIVITY OF PROBIOTIC PRODUCED METABOLITES AGAINST PATHOGENS

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Probiotics are microorganisms which gives a beneficial health benefit on the host when is provided in suitable amounts. Probiotics in various food products such as dairy products have been used for centuries. Various studies have been shown that probiotics have a positive effect on human health, especially to normal digestive processes. Probiotics also help to maintain the animal's health. Because of that in nowadays has been increased the agricultural applications of probiotics in animal feed. The most commonly in the food and feed industry used probiotics belongs to *Lactobacillus* and *Bifidobacterium* genera [1].

In recent years a growing antibiotic-resistance has become a challenge. The number of antibiotic-resistant strains isolated from a human is increasing nowadays. Therefore, it is important to find a way to prevent the growth of pathogens which became antibiotic-resistant and is capable to colonize and adhere the mucosal surface [2].

Probiotics produce various metabolites such as lactic, acetic, citric acids and other antimicrobial substances like bacteriocins (antimicrobial peptides). Acids produced by probiotics help to acidify the medium by inhibiting the growth of pathogens [1]. Probiotics which produces bacteriocin in the gut could have an antagonistic effect on the pathogens and inhibit their growth [2].

The aim of this work was to evaluate antimicrobial activity of probiotic *Bifidobacterium* and *Lactobacillus* genera producing metabolites against pathogenic bacteria.

The ability of probiotic strains to produce antimicrobial metabolites was tested by an agar well diffusion assay. The antimicrobial activities against pathogens were determined by measuring the inhibition zones (mm) around the well. Antimicrobial activities of metabolites were evaluated in two ways: (a) the probiotics supernatants and (b) their produced bacteriocins like inhibitory substances (BLIS). Pathogens such as *Staphylococcus hyicus*, *Staphylococcus chromogenes*, *Staphylococcus aureus* and *Escherichia coli* were used for antimicrobial activity evaluation.

The metabolites produced by *Lactobacillus* spp. shown better inhibitory activity against pathogens comparing to strains belonging to *Bifidobacterium* genus. *Lactobacillus paracasei* subsp. *paracasei* DSM 20020, *L. paracasei* subsp. *paracasei* DSM 4905, *L. gasseri* DSM 20077 strains supernatants inhibited the growth of all 12 pathogens. *L. paracasei* subsp. *paracasei* produced BLIS also suppress the growth of several pathogens. While the metabolites of *Bifidobacterium bifidum* DSM 20082 shown antimicrobial activity against 8 from 12 pathogens. BLIS of *B. pseudolongum* DSM 20099 suppress the growth of *S. hyicus* DSM 20459. The results of this study confirm that probiotic bacteria may be used as an alternative for inhibition of pathogen growth in the host organism.

[1] D. Song, S. Ibrahim, S. Hayek, Recent application of probiotics in food and agricultural science. Probiotics, 1-34. (2012)

[2] A. Smith, C. Jones, Probiotics: Sources, Types and Health Benefits. Hauppauge. 182-203 (2012)