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Bacteriocinogenic *Lactobacillus plantarum* Inhibit Adhesion of Gastrointestinal Pathogens onto Extracellular Matrix and Intestinal Cells

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Probiotic lactic acid bacteria (LAB) can be explored to develop a safe and niche-specific therapeutic regimen against bacterial infections based on their ability to thwart adhesion of pathogens onto intestinal cells. The present investigation reports the potential of native *Lactobacillus plantarum* strains to inhibit adhesion of model gastrointestinal pathogens, *Enterococcus faecalis* and *Staphylococcus aureus* on extracellular matrix (ECM) and cultured intestinal cells (HT-29 cells). A native *L. plantarum* CRA21 strain rendered significant inhibition of *S. aureus* MTCC 96 and *E. faecalis* MTCC 439 adhesion onto ECM molecules, collagen and mucin, with the highest inhibition of *S. aureus* MTCC 96 adhered on collagen observed in the exclusion mode (83.61%) as compared to competition (62.4%) and displacement (38.58%) mode of adhesion assay. A dual-color flow cytometry (FCM) based adhesion assay indicated that in the exclusion mode, *L. plantarum* DF9 rendered notable inhibition of pathogen adhesion onto HT-29 cells, with the relative adhered population of *E. faecalis* MTCC 439 being 3.94% and that of *L. plantarum* DF9 being 77.56%. FCM along with principal component analysis (PCA) revealed that the native strains of *L. plantarum* DF9 and *L. plantarum* CRA38 could significantly affect both the adhesion process parameters k_d and e_m of pathogen, similar to the standard probiotic *L. rhamnosus* GG. Interestingly, addition of the bacteriocin plantaricin A obtained from *L. plantarum* could reduce the viability of ECM-adhered pathogens. Host cell adhesion assays indicated that addition of plantaricin A on LAB and pathogen adhered onto HT-29 cells led to a prominent reduction in the adhered *E. faecalis* MTCC 439 cells (17.4%) as compared to *L. plantarum* DF9 (70.5%), which highlighted the benefit of using LAB bacteriocin for selective eradication of pathogen and minimal collateral damage. It is envisaged that the native probiotic *L. plantarum* strains can be used in conjunction with LAB bacteriocins as niche-specific anti-adhesion therapeutic agents against gastrointestinal pathogens.

Biography:

Sandipan Mukherjee is a doctoral student in the Department of Biosciences and Bioengineering, Indian Institute of Technology Guwahati, India. During his doctoral tenure, he has essentially ascertained the probiotic attributes of native lactic acid bacteria (LAB) and its secreted bacteriocin in inhibiting pathogen adhesion onto extracellular matrix and cultured human intestinal cells.