Abstract

The present work entitled, “The Probiotic and Health promoting capabilities of Enterococcus faecium isolated from infant feces “was aimed at isolation and characterization of a probiotic Lactic Acid Bacteria strain from the gut flora of human infants and to investigate the health promoting capabilities of the strain by in vivo and in vitro studies.

The bacterial isolates obtained from infant gut microflora were screened for those belonging to the genera LAB and Bifidobacteria. Further screening based on preliminary probiotic characteristics such as the ability to resist biological barriers and antibacterial activity towards selected pathogens particularly, Salmonella typhi and Salmonella paratyphi A, selected a single LAB isolate for further evaluations. These pathogens are the major causative agents of enteric (typhoid) fever. The emergence of multidrug resistance in these strains is a cause of grave concern in India, since the disease is endemic in most parts of the country. The selected LAB isolate was identified as Enterococcus faecium MBTU-P1F1 based on its physiological, biochemical and molecular characterization. After having selected and identified a potential test strain with preliminary and essential probiotic capabilities, in vitro and in vivo studies were carried out to determine the desirable properties required for a probiotic strain. Enterococcus faecium MBTU-P1F1 showed appreciable viability in acidified skim milk at pH 4 and 5 after a storage period of 30 days at 4°C. Comparison of the aggregation and adhesion studies as well as the growth curve pattern of Enterococcus faecium MBTU-P1F1 with that of the enteric fever pathogens, Salmonella typhi and Salmonella paratyphi A demonstrated the capability of the strain in eliminating the pathogens prior
to the onset of infection. Oral administration of the probiotic candidate Enterococcus faecium MBTU-P1F1 to Balb/c mice revealed the capability of the strain in colonizing the gastrointestinal mucosa of the animal model. Evaluation of the internal organs and histopathological examinations did not indicate any sign of infection or adverse health effects in the host. Enterococcus faecium MBTU-P1F1 was found to be safe for human and animal use as indicated from the results of biofilm formation, sensitivity to Vancomycin and Minimum Inhibitory Concentration of Ampicillin. The strain produces a bacteriocin like substance active at low pH which is capable of inhibiting the enteric fever pathogens. The production of a bacteriocin like substance by Enterococcus faecium MBTU-P1F1 was detected by LC/MS and MALDI-TOF/MS analysis. The test strain produces, the enzymes β-galactosidase and bile salt hydrolase, can assimilate cholesterol and shows antioxidant capabilities. In vivo studies also supported the cholesterol lowering and antioxidant properties of the strain. Further Enterococcus faecium MBTU-P1F1 was found to enhance both the humoral and cell mediated immune response in Balb/c mice. Taken together, the work provides promising information about the probiotic properties and health benefits of Enterococcus faecium MBTU-P1F1 which makes it a suitable candidate for incorporation in functional foods.