

Bioprospecting of Oxalate Degrading Lactic Acid Bacteria for Potential Use in the Management of Kidney Stone Disease

Sreeja V.*, Khushboo Patel and Jashbhai B. Prajapati

SMC College of Dairy Science, Anand Agricultural University, Anand-388 110, Gujarat, India

*Corresponding author: sreeja_p70@rediffmail.com

Abstract

Background and Objective: Lactic acid bacteria (LAB) have the potential to degrade intestinal oxalate and this is increasingly being studied as a promising probiotic solution to manage kidney stone disease. In this study, oxalate degrading LAB were isolated from human feces and fermented foods and subsequently characterized and assessed for potential probiotic property *in vitro*.

Methods: Human faecal samples were collected from ten healthy individuals (mean age of 23–40) who had not taken antibiotics and probiotics at least for the past three months. Fermented milk products *viz.*, *dahi*, *chaas*, *lassi*, *shrikhand* were collected from in and around the areas of Anand district. To isolate lactic acid bacteria, desired dilutions of samples were prepared and plated on MRS agar medium. The plates were incubated at 37°C for 48-72h. Typical colonies of LAB were picked up and streaked on the MRS agar for further purification. The isolates were then studied for morphology using Gram's staining, biochemical reactions using API kits and growth characteristics in the presence of potassium oxalate. Active isolates were inoculated in MRS medium containing 10mM potassium oxalate and incubated at 37°C for 72h. Growth was measured at different intervals (0, 8, 24, 32, 48, 72h) as optical density at 600nm.

Results: A total of 10 fecal and 10 fermented milk samples were used for isolation of LAB. The average LAB count of fecal samples varied between 8-10 logcfu/g of faecal matter. For fermented milk products it varied between 5-8 log cfu/g of the products. Based on the morphological and biochemical characterization, 15 LAB isolates from fecal matter and seven fermented foods isolates were taken for further growth studies and oxalate degradation studies. API studies revealed that the fecal isolates mainly belonged to *Lactobacillus paracasei*, *Lactococcus lactis*, *Enterococcus faecalis* and *Aerococcusviridans*, *Lactobacillus crispatus*, *Lactobacillus rhamnosus*. Whereas the fermented products isolates belonged to *Lactobacillus paracasei*, *Lactobacillus fermentum*, *Lactobacillus plantarum*, *Lactobacillus rhamnosus*. Growth curve studies of fecal isolates in MRS medium containing 10mM Potassium oxalate exhibited variation. Some isolates entered into stationary phase after 8h of incubation while some other entered into stationary phase after 24h of incubation and few isolates were poor growers. In case of isolates from fermented products almost all of them showed good growth rate and remained in log phase up to 24h.

Conclusion: species isolates mainly belonged to genera *Lactobacillus* and *Enterococcus*. Most of the isolates were able to grow in presence of 10mM potassium oxalate. The isolates which showed promise belonged to *Lactobacillus paracasei ssp. paracasei*, *Enterococcus faecium*, *Lactobacillus helveticus*, and *Lactobacillus rhamnosus*.

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