

Bioprospecting Bifidobacteria as Novel and Indigenous Probiotic Strains

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Introduction

Bifidobacteria are currently being targeted as potential candidates for developing probiotic foods and nutraceuticals in view of processing several health promoting functions. Bifidobacteria classified under family *Actinomycetaceae* is an anaerobic gram positive bacteria having bifid morphology occupying majority of the gut microbiota particularly in infants and diminishes with age. Furthermore, some species such as *B. bifidum*, *B. breve* and *B. longum subsp. infantis* are typically associated with early stages of life, whereas others, such as *B. adolescentis*, seem to be more related with adults. They possess many potential therapeutic properties like hypocholesterolemic, antimutagenic and antioxidative effects. Hence, it has significant importance in food, feed supplements and functional foods. However, a major hindrance in the use of Bifidobacteria as probiotics is the non availability of an adequate number of properly characterized strains.

Objective

- To identify and characterize probiotic strains of *Bifidobacteria* isolated from human milk and infant feces.
- To assess antimutagenic and antioxidative effects of selected strain of Bifidobacteria by *in-vitro* methods.

Methodology

The study involved evaluation of probiotic properties, safety aspects and functional properties of *Bifidobacteria* isolated from human milk and feces.

Probiotic and safety evaluation of isolated strains

Around 40 probable isolates were obtained from different sources (Milk, Infant and Adult feces) out of which only 12 were found to be positive for genus specific biochemical test fructose-6-phosphate phosphoketolase. These isolates were further characterized using genus specific PCR with primer pair P0 and Lm3, which gave positive amplification band of 1.4kb, after this 16S rRNA sequencing of selected isolates was carried out which showed 8 *B. animalis*, 3 *B. breve* and 1 *B. pseudocatenalum* and sequences were submitted to Gen Bank. These isolates were further subjected to a subtractive system of *in-vitro* analyses based on the guidelines for evaluation of probiotics. Probiotic characteristics like deconjugation of bile salts, percent cell surface hydrophobicity & antimicrobial activity against various pathogens were observed, for almost all isolated strains. Three Bifidobacteria strains out of 12 were finally selected on the basis of their discernible probiotic attributes (resistance to bile and low pH, inhibition of intestinal pathogens, and attachment to intestinal cells) for safety evaluation (antibiotic resistance, hemolytic activity and mucin degradation). The absence of hemolytic activity and mucin degradation were found invariably among all the strains.

Evaluation of probiotic Bifidobacteria for their functional attributes

The study was further extended to evaluate the isolates for their potential antioxidative (ABTS method) and antimutagenic (AMES method) properties.



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Result and Discussion

Among 12 isolates, NBIF-2, 5, 7, 9 and ATCC-Bb, the relatively high tolerance to acidic conditions were observed to be found coupled with the appreciable bile tolerance characteristics. Maximum antioxidative activity was observed in NBIF-2, which showed 56.56% of radical inhibition. Highest antimutagenicity of isolates against sodium azide (NaN_3) was shown by NBIF-2 and 7 isolates (52 % and 53 % respectively).

Conclusion

In the quest for novel probiotics of native origin, 12 strains of *Bifidobacteria* have been isolated from human sources duly identified by both biochemical and molecular methods and three strains (NBIF-2, 5, 7) were found to be endowed with appreciable probiotic and functional activities.

