Some studies on characterization of bacterial contents in bio-yoghurts marketed in Europe and Sri Lanka

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Abstract

The consumption of bio-yoghurts containing probiotic bacteria has been practiced by the health conscious population all over the world for the last decade. These probiotic bacteria have been claimed to have health benefits on humans including reduction of serum cholesterol level, improvement of lactose metabolism and prevention from some forms of cancer. The widely used probiotic bacterial species in bio-yoghurts include some species of the genera *Lactobacillus* and *Bifidobacterium*. To retain the health benefits, these products should carry probiotic organisms of human origin and should contain organisms at a population level of more than 10^6 CFU/g at the time of consumption. Furthermore, poor survival of these organisms in bio-yoghurts has been reported. Therefore, studies were undertaken to determine the population level and survival kinetics of probiotic organisms and identify the organisms that are present in bio-yoghurts in Europe and Sri Lanka.

The population levels of *Streptococcus thermophilus, Lactobacillus bulgaricus* (both yoghurt bacteria), *Lactobacillus acidophilus* and bifidobacteria (both probiotic bacteria) were determined during storage at chill temperature (4 °C) using M17 Agar, MRS Agar, MRS-Salicin Agar and Bifidobacterium Iodoacetate Medium, respectively. The standard plate count techniques such as Aerobic/Anaerobic Plate Count and Miles Misra Techniques were employed in enumeration of bacteria in bio-yoghurts. The organisms were identified to the species level using API strips (biochemical methods) and 16S rRNA gene targeted PCR technique. The pH/titratable acidity, dissolved oxygen content and redox potential (E_h) in bio-yoghurts during storage were also determined.

A sufficient level of population ($>10^6$ CFU/g) of *L. acidophilus* and bifidobacteria in bio-yoghurts in Europe and Sri Lanka at the time of manufacture/sale was observed. However, the viability of these organisms decreased during storage at chill temperature (4 °C) and on expiry the population level present was inadequate ($<10^6$ CFU/g) to have reported health benefits. Therefore, it can be concluded that the sooner these products are consumed, the higher the chances that consumers ingest a sufficient load of

probiotic organisms. Storage time, pH/titratable acidity, dissolved oxygen content and redox potential appeared to be the determinants of the survival of probiotic organisms. Biochemical and molecular techniques revealed that the bio-yoghurts marketed in Europe contained *Bifidobacterium animalis*, a strain of bifidobacteria of animal origin. *B. animalis* showed significantly ($P<0.05$) better survival and resistance to acidity, bile and oxidative stress. It can further be concluded that *B. animalis* is used primarily for technological reasons since the health benefits of animal bifidobacterial species have not been researched to the same extent as human associated strains. Further studies need to be carried out to identify the probiotic species in bio-yoghurts produced and marketed in Sri Lanka.

Keywords: Probiotics, Survival, Health benefits, *Lactobacillus, Bifidobacterium*