

Oral Care and Probiotics

November 14-16, 2016 Orlando, USA

Pancreatic lipase inhibitory activities of lactic acid bacteria isolated from raw camel milk

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Obesity, as an ever-growing epidemic, remains the top contributor to global burden of disease. As pancreatic lipase is the primary lipase that hydrolyzes dietary fat molecules in the human digestive tract and obesity is primarily a disorder of lipid metabolism, hence, selective inhibition pancreatic lipase could be targeted for its management. Lipstatin (Orlistat), a FDA approved pancreatic lipase inhibitor obtained from fermentation broth of Actinomycetes remains the most celebrated and successful anti-obesity drug till now. However, excessive inhibition of pancreatic lipase leads to certain discomforts like steatorrhea and isolated cases of organ toxicity. Till today, the ability of lactic acid bacteria (LAB) towards inhibition of pancreatic lipase remains to be unexplored. Hence, the present study was undertaken to explore the pancreatic lipase inhibitory potential of lactic acid bacteria isolated from camel milk. *Streptococcus* and *Lactobacillus* isolates were isolated from raw milk samples collected from local camel farms of Al Ain, Abu Dhabi, UAE. Further screening of lipase inhibitory activity using cell free extracts (CFE) was done and inhibitory activities were determined by comparing the release of p-Nitrophenol from P-Nitrophenyl palmitate through porcine pancreatic lipase type VI, in presence and absence of CFE using Orlistat as positive control while PBS, as negative control. Overall, lipase inhibitory profile of 97 LAB isolates and 11 reference strains was achieved. A wide variation in inhibitory activities was observed among isolates and reference cultures. The *Streptococcus* isolates (52) inhibition ranged from 3.0-99%. 11 isolates possessed potent inhibitory activities comparable or higher than Orlistat (83%; 2 mg/ mL). Among 45 isolates of lactobacilli negative inhibition was observed among 13 isolates, while for rest 32 isolates it ranged from 4.0-81%. Inhibition percentage in reference cultures ranged from 3.0-37%. *L. acidophilus* DSMZ 9126 showed strongest inhibition while *L. gasseri* 20243 showed lowest inhibition. These initial results definitively demonstrate that LAB isolated from raw camel milk have pancreatic lipase inhibitory activities and can reduce the hydrolysis of dietary fats *in vivo* and future use of probiotic bacteria in this field.

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Probiotics: Current applications and future prospective

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Probiotics are defined as live microorganisms that are added to foodstuff in order to enhance the health of their host. Traditionally they have been used in dairy products such as milk, cheese and yogurt. The improvement of technology has allowed advanced exploration of their use. One commonly reported feature is the antibacterial activity which consists of the inhibition of pathogens due to the secretion of bacteriocins. For this reason, some studies have suggested the use of probiotics as a potential alternative to the usual antibiotics which have been linked with the advent of resistant genes. Further studies have reported probiotics to have the ability to reduce lactose in dairy products, improve digestion as well serving as growth promoters in animals. Other reported beneficial aspects of probiotics include lowering cholesterol and the stimulation of the immune system by boosting the production of cytokine and increasing the IgA concentrations. In this paper we evaluate the relationship between the findings of different *in vitro* and *in vivo* research studies on probiotics, the current technological applications as well as prospective development on the use of probiotics.

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