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Isolation of Lactic Acid Bacteria with High Biological Activity from Local Fermented Dairy Products

B. Munkhtsetseg, M. Margad-Erdene and B. Batjargal

Department of Biochemistry and Bioorganic Chemistry, Faculty of Biology, National University of Mongolia, e-mail: batjargal@biology.num.edu.mn

Abstract

The thirty-two strains of lactic acid bacteria were isolated from the Mongolian traditional fermented dairy products, among them 25 strains show antimicrobial activity against test microorganisms including *Escherichia coli*, *Staphylococcus aureus*, *Enterococcus faecalis*, *Pseudomonas aeruginosa*. Protease sensitivity assay demonstrated that the antimicrobial substances produced by isolates A23, T2 are bacteriocins as their antibacterial activities were eliminated completely after treatment with protease. Identification of bacteria is being carried out. Among the isolates 22 strains show protease enzyme producing activity. The selected strains isolated from mare's fermented milk (airag or kumis) and yoghurt (tarag) show the specific protease activity from 7.9 μg/ml to 11.9 μg/ml. The strain T2, isolated from yoghurt exhibited the highest proteolytic activity.

Key words: Lactic acid bacteria, antimicrobial activity, bacteriocins, proteolytic activity

Introduction

Fermented products are integral part of Mongolian heritage developed over a long period, which have great social, religious, cultural, economic and medicinal importance. There is a wide variety of fermented milk products in Mongolia because of variations in the raw materials, processing methods which come from the habits and customs of the different regions of country. The most common fermented milk product of Mongolia is *airag* which traditionally made from mare's milk. Another kind of fermented milk is *tarag*, which is prepared from cow, goat and sheep milk. A third indigenous dairy product is *khoormog,* which is prepared from camel milk (Baldorj & Namsrai, 1980; Damdinsuren *et al.*, 2008). Fermented products have probiotic effects as they contain live microorganisms. Lactic acid bacteria (LAB) play in vital role for fermentation of Mongolian traditional dairy products (Damdinsuren *et al.*, 2008; Batdorj *et al*., 2007).

LAB produce different antibacterial substances including organic acids (lactic acid, acetic acid), hydrogen peroxide and bacteriocins. These substances are used as bioconservants for food preservation and improve the test and quality of dairy products (Kashket, 1987; Luquet & Corrieu, 2005). Bacteriocins are ribosomally synthesized substances of proteinaceous nature during growth of lactic acid bacteria. These bacteriocins protect host organisms by killing or inhibiting the growth of other bacteria (Klaenhammer, 1993). Many bacteriocinogenic lactic acid bacteria have been found in the numerous fermented dairy products. Over the past few years, studies concerning on bacteriocins produced by LAB have received an increasing interest and many new bacteriocins were discovered recently (Nissen-Mayer & Nes, 1997; Ennahar *at al*., 1999; Luquet & Corrieu, 2005). It was revealed that bacteriocins not only used as biopreservatives, but also used as medicine during prevention of different diseases as an alternatives of antibiotics (Twomey *et al*., 2000; Ryan *et al*., 1998; Hillman, 2002). Sometimes bioactive peptides can be released in proteolysis by lactic acid bacterial enzymes.

Many industrially utilized dairy starter cultures are proteolytic to some extent. Bioactive peptides can, thus, be generated by the proteolytic activities of the strains of starter and non-starter bacteria. The single most effective way to increase the concentration of bioactive peptides in fermented dairy products is to ferment or co-ferment with highly proteolytic strains of LAB. The choice of strains influences the release of effective bioactive peptides (Gobetti *et al*., 2004)

This study is part of continuing effort to