Biological activity of the non-microbial fraction of kefir: antagonism against intestinal pathogens

Carolina Iraporda [1,2], Mário Abatemarco Júnior [3], Elisabeth Neumann [3], Álvaro Cantini Nunes [3], Jacques R. Nicoli [3], Analía G. Abraham [1,4], Graciela L. Garrote [1]

Short title: Antimicrobial activity of non-microbial fraction of kefir

[1] Centro de Investigación y Desarrollo en Criotecnología de Alimentos (CIDCA, UNLP-CONICET). Calle 47 y 116. La Plata (1900), Bs. As., Argentina;

[2] Departamento de Ingeniería Química, Facultad de Ingeniería de Olavarría, Universidad Nacional del Centro de la Provincia de Buenos Aires. Av. Del Valle 5737. Olavarría (7400), Bs. As., Argentina;

[3] Department of Microbiology, Institute of Biological Sciences, Federal University of Minas Gerais (UFMG). Av. Antonio Carlos 6627, 31270-901. Belo Horizonte, Brazil;

[4] Área Bioquímica y Control de Alimentos, Facultad de Ciencias Exactas, Universidad Nacional de La Plata. Calle 47 y 115, La Plata (1900), Bs. As., Argentina.

Corresponding author: Carolina Iraporda

Adress: Facultad de Ingenieria de Olavarría (FIO-UNICEN). Av. Del Valle 5737, Olavarria (7400), Bs. As., Argentina.

E-mail: carolinairaporda@gmail.com

ABSTRACT

Kefir is a fermented milk obtained by the activity of kefir grains which are composed by lactic and acetic acid bacteria, and yeasts. Many beneficial health effects have been associated with kefir consumption such as stimulation of the immune system and inhibition of pathogenic microorganism. Considering the role that microbial metabolites may have on the biological activity of fermented milk the aim of this work was to characterize the non-microbial fraction of kefir and to study the antagonism on *Escherichia coli*, *Salmonella* spp. and *Bacillus cereus.* During milk fermentation there was a decrease in pH, and in lactose content. The main fermentation products were lactic acid and acetic acid. The non-microbial fraction of kefir added to nutrient broth at concentrations above 75% v/v completely inhibited the growth of pathogens studied. The inhibitory capacity was related to the concentration of undissociated lactic acid as products lost this activity when neutralized even when they were concentrated. Pre-incubation of epithelial cells with non-microbial fraction of kefir did not modify the association/invasion of *Salmonella;* meanwhile pre-incubation of *Salmonella* with this fraction significantly decreased its ability to invade epithelial cells. Administration of non-microbial fraction of kefir did not affect survival of animals challenged with *Salmonella*, however a protective effect of lactate was observed against this pathogen infection. The results show that metabolites produced during fermentation and present in the non-microbial fraction of kefir have antagonist activity against intestinal pathogens that may contribute to the beneficial health effects associated with the consumption of the product.