

## Encapsulation of *Lactobacillus acidophilus* with two methods and evaluation of size distribution, encapsulation efficiency, acid viability of encapsulated bacteria

S. Mirzaeei<sup>1</sup>, M. Moieni -Arya<sup>2,\*</sup>

<sup>1</sup>Faculty of Pharmacy, Kermanshah University of Medical Sciences, Kermanshah, Iran

<sup>2</sup>Students Research Committee, Faculty of Pharmacy, Kermanshah University of Medical Sciences, Kermanshah, Iran.

**Background and Aims:** Several method of microencapsulation was developed to increase the efficacy of capsules in protecting the encapsulated bacteria under simulated gastric conditions. These methods differ in size distribution, encapsulation efficiency, acid survivality. This study evaluates emulsion and extrusion technique as encapsulation method with same material and condition.

**Methods:** *Lactobacillus acidophilus* was encapsulated in calcium alginate by emulsion and extrusion methods and tested for its survival in simulated gastric conditions. Encapsulation methods were carried out under optimal conditions (2.2 % w/v) alginate, 109 CFU/ml, 30 min hardening in 0.2 M CaCl<sub>2</sub> and string at 250 rpm. The effects of different methods on morphology, size distribution, encapsulation efficiency, and acid viability of encapsulated bacteria were investigated.

**Results:** There was significant difference ( $p > 0.05$ ) in the viability of encapsulated cells in two methods. The viability of the cells in the microcapsules increased in alginate capsule size. Using extrusion method produce narrow size distribution, also increase in cell load during encapsulation and increased the number of bacterial survivors at the end of 2-h incubation in simulated gastric conditions.

**Conclusions:** The described methods are able to produce microcapsules of small size and uniform shape which are mechanically stable in low pH and maintain the viability of the cells in acid condition. These microcapsules seem to be suitable for further therapeutic studies in an animal model of human disease.

**Keywords:** *Lactobacillus acidophilus*; Alginate; Extrusion method; Emulsification method; Microcapsulation