

Preparation and comparison of alginate beads containing *Lactobacillus acidophilus* by CaCl_2 and AlCl_3 as crosslinker

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Background and Aims: Probiotics are live microorganisms (bacteria or yeasts), which when ingested or locally applied in sufficient numbers confer one or more specified demonstrated health benefits for the host. These benefits include maintenance of normal intestinal microflora, defense against enteropathogen infections, controlling serum cholesterol levels, improving lactose utilization in persons who are lactose maldigestors by production of α -galactosidase, and possessing anticarcinogenic activities. To improve viability and stability of probiotics and efficient delivery of the cells to their active sites encapsulation of probiotics in wide variety of polymers such as alginate which show characteristic ion binding for multivalent cations such as Al^{3+} and Ca^{2+} and this forms the basis for their gelling properties.

Methods: different formulations containing alginate (ALG) and CaCl_2 or AlCl_3 in different concentrations were prepared using extrusion method. Two appropriate formulations which are better than other in shape and stiffness were selected and characterized in terms of size, morphology (aspect ratio), viabilities in acid (pH 1.8, 2h) and bile (1% 2h) conditions.

Results: The results showed that Alginate beads encapsulating probiotic *L. acidophilus* with AlCl_3 crosslinker in the size range of 1.45 to 1.65 mm with Encapsulation Efficacy (EE) about %74 were prepared using extrusion method. Prepared beads with CaCl_2 crosslinker have the same size ranges with EE about %58.9 using the same method. As well as the survival percent of prepared beads with AlCl_3 in acid and bile condition is better than those prepared with CaCl_2 . So AlCl_3 suggested as crosslinker in preparing alginate beads which can be used as alternative for CaCl_2 .

Conclusions: According to our in vitro studies AlCl_3 can be a suitable crosslinker candidate for substitution with CaCl_2 for *Lactobacillus acidophilus* coating with alginate.

Keywords: *Lactobacillus acidophilus*; Alginate; AlCl_3 ; CaCl_2