Enhancing Probiotic Survival and Stability by Encapsulation of Enterococcus Strains Using Sodium Alginate and κ-Carrageenan Microbeads

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Probiotics, microencapsulation, Enterococcus, sodium alginate, κ carrageenan

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Abstract

Introduction: Probiotic-rich functional foods are crucial for supporting gut health, boosting immunity, and enhancing digestion. They also assist in keeping gut bacteria in check, they lower the chance of digestive problems and improve overall health. Microencapsulation shields probiotics from tough environments in gut, improving their durability and effectiveness, guaranteeing they reach the gut efficiently to provide health advantages.

Objectives: To microencapsulate probiotic *Enterococcus* strains using sodium alginate and κ-carrageenan and check its survival under *in vitro* digestive environments and higher temperature.

Methods: In the present study, probiotic strains *Enterococcus faecium* LABYP9 (NCBI Accession No. PP228215), *Enterococcus faecalis* LABYP30 (NCBI Accession No. PP228373), and *Enterococcus faecium* LABYP34 (NCBI Accession No. PP228654), were encapsulated in microbeads composed of sodium alginate and κ-carrageenan. The survival of these encapsulated probiotics in simulated gastric (pH 2.0) and intestinal juices (pH 8.0) was examined, along with their stability at varying temperatures (4°C and 65°C).

Results: Microbeads were prepared, ranged in size from 548 µm to 600 µm and had either a drop-like or rod-shaped appearance. Compared to free cells, the encapsulation with sodium alginate and κ-carrageenan significantly enhanced the survival of the probiotics in both artificial gastric (pH 2.0) and intestinal (pH 8.0) environments. Additionally, the encapsulated bacteria demonstrated better storage stability at 4°C and 65°C for 30 min., than free cells.

Conclusions: These findings propose that microbeads made from sodium alginate and κ-carrageenan are potentially effective for encapsulating, protecting, and releasing *Enterococcus* strains as nutritional supplements.

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