

Microencapsulation of *Lactococcus lactis* Gh 1 with gum arabic and *Synsepalum dulcificum* via spray drying for potential inclusion in functional yogurt

ABSTRACT

There has been an explosion of probiotic incorporated based product. However, many reports indicated that most of the probiotics have failed to survive in high quantity, which has limited their effectiveness in most functional foods. Thus, to overcome this problem, microencapsulation is considered to be a promising process. In this study, *Lactococcus lactis* Gh1 was encapsulated via spray-drying with gum Arabic together with *Synsepalum dulcificum* or commonly known as miracle fruit. It was observed that after spray-drying, high viability ($\sim 10^8$ CFU/mL) powders containing *L. lactis* in combination with *S. dulcificum* were developed, which was then formulated into yogurt. The tolerance of encapsulated bacterial cells in simulated gastric juice at pH 1.5 was tested in an in-vitro model and the result showed that after 2 h, cell viability remained high at 1.11×10^6 CFU/mL. Incubation of encapsulated cells in the presence of 0.6% (w/v) bile salts showed it was able to survive ($\sim 10^4$ CFU/mL) after 2 h. Microencapsulated *L. lactis* retained a higher viability, at $\sim 10^7$ CFU/mL, when incorporated into yogurt compared to non-microencapsulated cells $\sim 10^5$ CFU/mL. The fortification of microencapsulated and non-microencapsulated *L. lactis* in yogurts influenced the viable cell counts of yogurt starter cultures, *Lactobacillus delbrueckii* subs. *bulgaricus* and *Streptococcus thermophilus*.

Keyword: *Streptococcus thermophilus*; *Synsepalum dulcificum*; Functional food; Gum arabic; Microencapsulation; Probiotic; Spray drying; Yogurt