

ABSTRACT

Pediococcus acidilactici has gained research interest due to its potent probiotic characteristics. However, it has low survivability in the gastrointestinal tract (GIT). Thus, spray drying is commonly used to improve its survival. Although current studies obtained high spray drying encapsulation efficiency, further evaluation of its survival during GIT and viability during storage is not well-studied. Moreover, the most studied encapsulation material is orange juice, limiting its application to orange-flavored products. Hence, this study investigated the effect of Whey Protein (WP) and Gum Arabic (GA) as alternative spray drying encapsulation materials for *P. acidilactici* on its encapsulation efficiency, viability during storage, survival during GIT simulation, and physicochemical properties (production yield, moisture content, water activity, Fourier-transform infrared spectroscopy (FTIR) profile, and scanning electron microscopy (SEM) analysis). Three formulations of WP to GA ratios were tested (A=1:1, B=3:1, C=1:3). Samples had 87.13 to 93.08% encapsulation efficiency, 84.93 to 95.04% survival during GIT simulation, and maintained sufficient viable cell (7 Log CFU/g) during 3 weeks of storage (25°C). The product yield was 63.12-67.10%, with 4.66-5.91% moisture content and 0.17-0.21 water activity. The FT-IR showed structural changes in WP and GA, indicating the physical binding of the encapsulation matrix. Lastly, the SEM result showed semi-spherical microcapsules in all samples. Significant effects of varying WP to GA ratios were found in the GIT survival and SEM results. The sample with higher WP content (B) has higher survival and a smoother microcapsule surface. These findings suggest that WP and GA can be promising encapsulation materials for *P. acidilactici* spray drying, especially used at a higher WP to GA ratio.

Keywords: probiotic, encapsulation, spray drying, *Pediococcus acidilactici*, whey protein, gum arabic.