Alginate-Persian Gum-prebiotics microencapsulation impacts on the survival rate of Lactococcus lactis ABRIINW-N19 in orange juice

ABSTRACT

In order to commercialize functional foods, probiotic cells must exhibit high resistance to enzymatic and digestive conditions as well as acceptable stability under different heat/humidity conditions. Therefore, to achieve the above goals and controlled release, probiotics are microencapsulated with appropriate protective methods and matrix materials. This study investigated the stability, survival rate, colony release and pH/sugar content of free and microencapsulated probiotic cells in orange juice. Seven types of herbal-based hydrogels (alginate-Persian Gum (PG)) were mixed with various prebiotic (fructooligosaccharides (FOS), and inulin) concentrations and then were used for microencapsulation of Lactococcus lactis ABRIINW-N19 by extrusion method. All formulations showed high encapsulation efficiency (≥98.4%) and acceptable viability of probiotic cells in simulated digestive conditions (≥61%) compared to free cells. All gel formulations showed high stability of viable cells during 6 weeks storage in orange juice at 4 °C. In expansion, they were released after 2 h in colonic conditions and were stable for up to 12 h. Furthermore, a decrease in pH/glucose content and prebiotic activity was observed in formulations containing FOS and Inulin. In summary, this study showed that the new alginate-PG-inulin polymer has the potential to be used as a matrix for microencapsulation of probiotic cells in fruit juice.

Keyword: Probiotic; Microencapsulation; Persian gum; Fructooligosaccharides; Lactococcus lactis