Data Article

Viability dataset on microencapsulated probiotics: Sodium alginate viscosity effect

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A B S T R A C T

Probiotics must be delivered alive to exert a positive health effects in site of action. But, they must survive different extreme condition through intestinal tract. Microencapsulation techniques have received considerable attention and facilitate a suitable carrier system to reach the target site. The encapsulation techniques applied to probiotics can be classified into two groups, depending on the method used to form the beads: extrusion (droplet method) and emulsion or two-phase system [1], where extrusion is evolved in the vibration technology and in particular, when the wavelength of an asymmetric disturbance exceeds the jet circumference, the break-up occurs. Droplet size depends on nozzle (jet) diameter, viscosity of fluid, surface tension, jet velocity and frequency of disturbance [2,3].

The data presented in this article evaluated the performance of microencapsulated Lactobacillus casei (probiotic bacteria) using vibration technology and using two kinds of sodium alginate gel matrix (low and medium viscosity) and compare the effect over viability.

The best conditions for higher viability of probiotics were at a concentration of sodium alginate (medium viscosity) at 2%, with a nozzle of 450 μm and a frequency of 1000 Hz. The data are related to the research article entitled “Microencapsulation of probiotics by efficient vibration technology” [3], where Microencapsulator provide by BÜCHI (Encapsulated B-390) was used.

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1. Data

Viability of microencapsulated *Lactobacillus casei* at a different frequency of microencapsulation and at different nozzle size 450 μm, 750 μm, 1000 μm, and at low and medium viscosity sodium alginate concentration are shown in Figs. 1 and 2, respectively. Data show 3 different alginate concentration, 1%, 2% and 3% (figures A, B, and C, respectively). The operational variables of the microencapsulation equipment can be modified to achieve a better target and these data represent the viability of *Lactobacillus casei* (log UFC/sphere). At 450 μm, viability range varied between 7.395 and 8.247 log CFU/spheres for three frequencies and low viscosity sodium alginate concentration, meanwhile at the same nozzle size range was between 7.131 and 8.530 log CFU/spheres for three frequencies medium viscosity sodium alginate concentration. At 750 μm, viability range varied between 7.019 and 8.531 log CFU/spheres for three frequencies medium viscosity sodium alginate concentration. And at 1000 μm, viability range varied between 0.0 (at 3000 and 5000 Hz and concentration of 2%) and 7.845 log CFU/spheres for three frequencies and low viscosity sodium alginate concentration, meanwhile at the same nozzle size range was between 6.992 and 8.486 log CFU/spheres for three frequencies medium viscosity sodium alginate concentration. At low viscosity, the highest viability was obtained at a concentration of 3%, while at medium viscosity better viability was obtained at a level of 2% and for all the nozzles and frequencies studied, the viability was higher than 8.427 log CFU/spheres. The highest viability of the probiotics was at a 2% sodium alginate concentration (medium viscosity) and a frequency of 1000 Hz, and there was no significant difference \( P < 0.05 \) between the size nozzle (the maximum viability value was 8.531 log UFC/g spheres at 450 μm and were the smallest beads size).
Fig. 1. Viability of microencapsulated *Lactobacillus casei* at different frequency of microencapsulation and low viscosity alginate. A: alginate concentration 1%, B: alginate concentration 2%, C: alginate concentration 3%. (Nozzle size: • 450 μm, ○ 750 μm, ● 1000 μm). Different letters mean a significant difference ($P < 0.05$) between the nozzle size in the same frequency group.
2. Experimental design, materials, and methods

2.1. Materials

*Lactobacillus casei* (DSM 20011) were supplied by DSMZ-Germany and used in lyophilized form according to Olivares et al. [3].

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*Fig. 2.* Viability of microencapsulated *Lactobacillus casei* at different frequency of microencapsulation and medium viscosity alginate. A: alginate concentration 1%, B: alginate concentration 2%, C: alginate concentration 3%. (Nozzle size: @ 450 μm, ● 750 μm, ○ 1000 μm). Different letters mean a significant difference (P < 0.05) between the nozzle size in the same frequency group.
Two kinds of alginic acid sodium salt from Sigma-Aldrich, St. Louis, MO, USA were used. Low viscosity (Sigma cod. A1112) with 4–12 cP and medium viscosity (Sigma cod. A2033) and greater than 2000 cP. A sophisticated microencapsulation technology developed by BÜCHI (Encapsulator B-390; CIENTEC Instrumentos Científicos, S.A. Chile) was used.

2.2. Microcapsules production

Each sodium alginate solution (low and medium viscosity) was prepared at double of its concentration and then mixed at 1:1 ratio with a *Lactobacillus casei* solution (prepared at 5g/L with lyophilized powder with more than 10 log CFU/g).

To form microcapsules, BÜCHI Encapsulator B-390 were used. Nozzle size and frequency were changed for each assay. Flow rate was constant (20 mL/min) and controlled by pump injector. Voltage of 250 V was used [2,3].

2.3. Microencapsulated cell count

The microcapsules were dissolved in 50mM sodium citrate (pH 7.5) to release *Lactobacillus* cells into the supernatant for counting according Olivares et al. [3].

2.4. Statistical analysis

The data are expressed as the mean ± standard deviation of triplicate experiments. The data was subjected to analysis of variance (ANOVA) to compare results and determine statistical significant difference (*P* < 0.05).

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Conflict of interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.dib.2019.104735.

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