



Development of biopolymer wafers for bucal administration of curcumin

Brenda Dalossi Prado*, Juliana Souza Ribeiro Costa, Laura de Oliveira Nascimento

Abstract

Biopolymeric wafers facilitate buccal administration of drugs to achieve sustained release of active molecules. The Curcumin has antimicrobial and anti-inflammatory properties, which can benefit buccal therapy of oral affections. Considering the aforementioned properties, this work aimed to obtain a freeze-dried biopolymer wafer, loaded with curcumin and intended for the treatment of inflammatory buccal diseases.

Key words:

Bucal wafer, curcumin, biopolymers

Introduction

Bioadhesive polymers promote longer contact between the active substance and the oral mucosa, allowing maintenance of the concentration of the drug in the organism within the appropriate therapeutic range. Therefore, biopolymer wafers facilitate administration of the drug, bring comfort to the patient and make procedures less invasive. Curcumin, a major component of the rhizomes of *Curcuma longa L.*, has anti-inflammatory and antimicrobial properties known for centuries in Indian medicine; it was also tested for buccal affections, showing great promise for oral pre-treatment of inflammatory dental diseases. Therefore, this work aimed the development of biopolymer wafers as a vehicle for the sustained buccal administration of curcumin.

Results and Discussion

The wafers were obtained by freeze-drying alginate and gelatin gels in micro-well plates under a product temperature driven process (Lyostar 3 pilot freeze-drier). The pre freeze-drying characterization consisted in the evaluation of the pH and zeta potential of the gel. The mixture of gelatin (10 mg/mL) and alginate (4 mg/mL) (SAGE) formed a translucent, homogeneous and stable gel, for at least 24h. The zeta potential of dispersed polymers in diluent were analyzed (table 1), with results comparable to previous reports ^{1,2}.

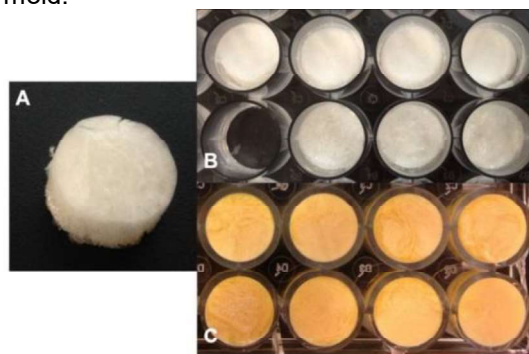
Table 1. Zeta potential values (mV) and pH of the polymeric solutions

Polymer	ζ Potential (mV)	pH
Gelatin 10 mg/mL (GE)	-6.89 ± 0.57	5.85
Sodium alginate 4 mg/mL (SA)	-58.2 ± 3.81	5.02
SAGE	-38.6 ± 1.33	5.63
SAGE + CUR	-30.2 ± 2.70	6.40

The SAGE formulation was visually homogeneous and presented adequate pH to the oral mucosa. SAGE samples were lyophilized with and without curcumin (200 μ g/mL) in a lyophilizer pilot. Characterization post freeze-drying gel included visual appearance and drug release profile. The formulations presented porous, rectilinear surface, easily detached from the mold, uniform height between the units and structurally intact (image 1).

The visual analysis of curcumin wafers confirmed that the drug is homogeneously distributed in the matrix, despite its hydrophobic nature.

Image 1. Freeze-dried alginate/gelatin wafers: (A) No drug; (B) No drug, in the mold; (C) Loaded with curcumin, in the mold.



Preliminary drug dissolution studies over a 2-hour period showed 37.8 % (± 4.2 %) cumulative drug release for the wafers obtained from gels containing curcumin. Despite the good incorporation of curcumin and its wafer integrity, the dissolution profile was not adequate, so other pharmacotechnical alternatives will be combined with the wafer in order to improve its dissolution.

Conclusions

The characterization of the biopolymer gels (SAGE), with and without curcumin, showed satisfactory conditions for the oral mucosa and homogenous distribution in the matrix. Drug release profile was not satisfactory, but ongoing studies are being carried out to optimize drug release test and drug solubility.

Acknowledgement

Acknowledgements to CNPQ, CAPES and FCF-Unicamp.

¹ Curtis, M. D.; Shiu, K.; Butler, W. M. e Huffmann, J. C. *J. Am. Chem. Soc.* **1986**, *108*, 3335.

² Pezzini, B. R., Silva, M. A. S. & Ferraz, H. G. Formas farmacêuticas sólidas orais de liberação prolongada: sistemas monolíticos e multiparticulados. *Rev. Bras. Ciênc. Farm.* **43**, 491–502 (2007).