Casein micelles as encapsulating material and delivery system for jaboticaba extract

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INTRODUCTION

Casein micelles as encapsulating material and delivery system for JABUTICABA EXTRACT

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The jaboticaba is a dark berry rich in vitamin C, minerals and phytochemicals (phenols and anthocyanins). These last ones have biological properties including strong antioxidant and anti-inflammatory, anti-diabetic, and anti-obesity properties. The polyphenols are found only in the fruit peel (~50% of fruit), which is not directly edible. Thus, the extraction of anthocyanins and other bioactive compounds from jaboticaba peel is of industrial interest. However, polyphenols originating from jaboticaba are unstable under environmental conditions and their encapsulation is necessary for industrial applications.

The casein micelles are natural nano-transporters with hydrophilic and hydrophobic binding sites which make favorable the encapsulation of lipophilic and water-soluble compounds. The casein micelles are a renewable resource obtained by the industrial techniques of dialysis and drying of bovine milk. Studies have reported that some anthocyanins are able to link to the casein monomers which make the micelles a promising encapsulation agent of polyphenols from jaboticaba fruit. Nonetheless, the caseins are unstable in pH 4.6 and a burst release of polyphenols in the stomach would be expected. Thus, the crosslinking of casein micelles with transglutaminase can make them more resistant to acid and improving the release of the active at different pH conditions.

METHODS

CASEIN MICELLE

Hydrophobic interactions

Hydrophilic interactions

Casein = β-Casomorphin-4

Caso = β-Casomorphin-7

γs - caseins

ANTHOCYANINS

Hydrophobic interactions

Hydrophilic interactions

B - anthocyanin

α - anthocyanin

R - anthocyanin

CONCLUSION

This work showed that crosslinked casein hydrogel can be a good candidate to encapsulate Jabuticaba extract. The polyphenols interact spontaneously with caseins and it is entrapped into micelles. The internal encapsulation of extract did not change the properties of caseins in suspension. However, the extract caused modifications in the protein matrix, which can be attested by rheological measurements and pore size evaluation. Crosslinked casein micelle hydrogel can encapsulate polyphenols without large changes in hydrogel properties. For this reason, this hydrogel can be applied to carry and delivery such compounds. After spray drying, the crosslinked micelles presented higher protection of polyphenols against stress agents such as aging and heat treatment, being a good alternative to encapsulation. This brings about the potential use of this encapsulation agent as functional ingredient for foods or drugs.