Casein micelles as encapsulating material and delivery system for jaboticaba extract

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The jabuticaba 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-nutritional, anti-tumor, 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 jabuticaba peel is of industrial interest. However, polyphenols originating from jabuticaba are unstable under environmental conditions and their encapsulation is necessary for industrial applications.

The jabuticaba extract has not been altering the porous size and rheological properties of casein micelles. The extract has not been altering the casein micelles in inflammatory, non-inflammatory, and oxidative stress conditions. The micelles have been treated with different pH (2.0 and 7.0) and the changes have been observed for antioxidant capacity and zeta potential (ζ) with antioxidant capacity being the most variable parameter. The results show that the crosslinked micelles were effective in maintaining the antioxidant performance of the polyphenol extract, better than caseins and the extract itself (powder).

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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 deliver 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.