Casein micelles as encapsulating material and delivery system for jaboticaba extract

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The jaboticaba is a dark berry rich in vitamin C, minerals and phytochemicals (phenolic 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 peels is of industrial interest. However, polyphenols originating from jaboticaba are unstable under environmental conditions and their encapsulation is necessary for industrial applications.

The polyphenols reduce the risk of disease

<table>
<thead>
<tr>
<th>Disease</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cancer</td>
<td>50%</td>
</tr>
<tr>
<td>Cardiovascular</td>
<td>8.5%</td>
</tr>
<tr>
<td>Diabetes</td>
<td>2.0%</td>
</tr>
<tr>
<td>Chronic diseases</td>
<td>5.0%</td>
</tr>
</tbody>
</table>

### RESULTS

The jaboticaba peel was placed in an extraction solution made of 70% (v/v) acetic acidified ethanol (pH 2.0). The mixture was put under ultrasonic treatment for 30 min. The suspension was concentrated until 30% of the initial volume. A total polyphenol content of 11.64 g L⁻¹ and monomeric anthocyanin content of 0.59 g L⁻¹ were found.

The jaboticaba extract was treated with different pH levels of citrate buffer (pH 2.0, 4.5 and 7.0) in order to evaluate the release of polyphenols in three different pH environments. The results show that the crosslinked micelles were efficient in maintaining the antioxidant characteristics of the polyphenolic extract, better than casein, and the extract itself.

### 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.