Antioxidant potential of bioactive corn starch aerogels incorporated with red onion skin extract for food packaging

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Abstract: Bioactive packaging is designed to interact directly with food in order to prolong its shelf life and increase the food safety. Corn starch is a low-cost and biodegradable polymer, being a good option for the development of aerogels. The red onion skin is generally discarded, adding a considerable amount of waste deposited on the planet. This residue is an alternative source of bioactive antioxidant compounds, especially phenolics. Antioxidants are present naturally or intentionally in food products aiming to delay the onset of oxidation phenomena, contributing to its conservation and maintaining its sensory characteristics intact. Thus, aiming at the production of biodegradable materials using renewable and undervalued precursors, the objective of this study was to develop corn starch aerogels with the incorporation of red onion skin extract. The aerogels were produced by gelatinization of 10% corn starch (w/v, in distilled water) at 90 °C and the onion skin extract was incorporated at different concentrations (0, 5, 10, and 15%, w/w), followed by five freeze/thaw cycles and subsequent lyophilization. The *in vitro* antioxidant potential was evaluated against the free radicals ABTS (2,2'-azinobis(3-ethylbenzothiazoline-6-acid)) and DPPH (2,2-diphenyl-1-picryl-hydrazyl) and the results were expressed in inhibition percentage. The free red onion skin extract showed an antioxidant potential of 95.3 and 91.5% against ABTS and DPPH radicals, respectively. The aerogels with 0, 5, 10, and 15% of extract showed a gradual increase in antioxidant potential of 7.1, 64.3, 82.0, and 90.5% against ABTS radical, respectively and 1.3, 45.3, 69.7, and 83.2% against DPPH radical, respectively. Corn starch aerogels showed strong antioxidant capacity, showing the potential to carry bioactive compounds to be delivered in food products that release a considerable amount of water, such as meat products. Thus, the aerogels are promising for applications in bioactive food packaging.

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