OBTAINING AND PHYSICOCHEMICAL AND BIOLOGICAL PROPERTIES OF FIXED BEE PRODUCTS

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Abstract

With the aim to obtain controlled release and to preserve the antioxidant, immunomodulatory and prebiotic activity of the bioactive compounds, microencapsulation of both honeydew honey and royal jelly into biopolymeric microparticles based on rye bran and flaxseed heteropolysaccharides (HPS) was successfully performed. Honeydew honey and royal jelly microcapsules were prepared by spray drying method and were characterized in terms of morphology and biological and physicochemical properties. Water activity and content, carbohydrate profile, total phenolic content, antioxidant activity, anti-inflamatory potential and prebiotic properties before and after encapsulation were determined. Moreover, *in vitro* release profiles of encapsulated phenolic compounds of bee's products were investigated in simulated gastrointestinal fluids. The stability of encapsulated bioactive compounds was further evaluated. It was found that phenolic compounds in the obtained honey encapsules showed on average 85.0% higher biostability during simulated digestion at the gastric stage, which led into their higher bioavailability in the small intestine. Moreover, the encapsulation process allowed the release of two to ten times more bioactive compounds in the small intestine in relation to the amount of compounds released from honey in its natural form, showing a good capacity to control the polyphenols delivery. Due to the resistance of the obtained encapsulates to the acidic pH in the stomach and digestive enzymes, the microcapsules showed prebiotic properties positively influencing both the growth, retardation of the dying phase and the pro-adhesive properties of probiotic bacteria, i.e. *Bifidobacterium* sp. and lactic acid bacteria. Moreover, as a result of fermentation of the microcapsules of bee products in the lumen of the large intestine, an increased synthesis of short-chain fatty acids, i.e. butyric acid, was found on average by 39.2% in relation to the SCFA concentrations obtained as a result of fermentation of native bee products. Furthermore, cell migration assay confirmed that the encapsulation of honey and royal jelly has a positive effect on the the wound healing process by stimulating both human endothelial cells of the HMEC-1 line and murine fibroblasts of the NIH-3T3 line, thus opening new perspectives for the exploitation of honeydew honey and royal jelly-loaded microcapsules for nutraceutical applications.