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Development of antioxidant encapsulated nano edible sheet using *Cocania Grandis* (Kowakka): an underutilized wild edible species in Sri Lanka

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Recently, food and nutrient security have become crucial concerns around the globe. In that context, using underutilized wild edible plant species become an option way to ensure food supply in acceptable quantity and quality. Referring to nutritional aspects, these plant species are generally recognized as potential sources of micronutrients and bioactive compounds that are essential to human health maintenance and to prevent of malnutrition. Even though they are enriched with a significant amount of nutrients, it does not mean that every ounce of those nutrients can be absorbed. Nano encapsulation technology has become a promising solution to protect food bioactive components against an unfavourable processes and storage conditions, chemical and mechanical barriers. By improving the bioaccessibility, nano encapsulation is able to increase the portion of bioactive compounds released from the food matrix which are available for intestinal absorption. For these reasons, this study was conducted to develop antioxidant encapsulated nano-edible sheet using an underutilized plant species namely *Cocania Grandis* (Kowakka). Ethanol based plant extracts (0.2%) were encapsulated by electrospinning technique using edible polymer mixture including hydroxypropyl- β -cyclodextrin (70%) and poly (ethylene oxide) (30%) as the wall materials. Fiber mats were then assessed for total polyphenol content using Folin ciocalteu reagent method while the ascorbic acid content was determined using 2, 6 dichlorophenol indophenol visual titration method. Antioxidant capacity was evaluated using 2,2-diphenyl-1-picrylhydrazyl (DPPH) and 2,2'-azino-bis (3-ethylbenzothiazoline-6-sulfonic acid (ABTS) assays. Antioxidant bioaccessibility of the fiber mats was tested using *in vitro* digestion model and the final accessibility value was calculated as the bioaccessibility fraction. Furthermore, the fiber mats were characterized for their physical properties using scanning electron microscopy and transmission electron microscopy. The antioxidant activity in Kowakka encapsulated fiber mat was 0.16 mg/mL (IC50) and 333.23 Trolox equivalent antioxidant capacity for DPPH and ABTS assays respectively. The total phenolic content was found to be 280.65 Gallic acid equivalents (GAE) mg/100 and ascorbic acid content was 4.80 mg/mL. According to the antioxidant bioaccessibility assessment, the bioaccessibility level of the encapsulated edible mat containing *C. grandis* was 63.65% higher than its' normal bioaccessibility level. *C. Grandis* encapsulated nano edible fiber mats will be a multifaceted approach for a number of applications in the food industry, as well as for improving human nutrition and health benefits.

Keywords: Antioxidants, Bioaccessibility, Electrospinning, Nano encapsulation, Underutilized wild edibles

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