

**Characterization and biological properties in vitro of sulfated- galactans from dietary fibre in an edible red seaweed**

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Currently, intake of seaweeds in Western countries is on the increase due to their nutritional value. Moreover, high content of undigested polysaccharides in the algal cell wall contributes to its high dietary fibre (DF) content (Rupérez & Saura-Calixto, 2001; Gómez-Ordóñez *et al*, 2010). The major component of the red seaweed *Mastocarpus stellatus* is DF (31.7g/100g dry weight) of which 72% is soluble fibre, mainly formed by carrageenans, sulfated-galactans with interesting associated physico-chemical properties (Gómez-Ordóñez *et al*, 2010) and multifunctional antioxidant capacity *in vitro* (Jiménez-Escrig *et al*, 2011). As biological properties of algae are highly dependent on individual composition, the role of carrageenans from *M. stellatus* has been further studied *in vitro* to elucidate the relationship between polysaccharide structure and function. Thus, hybrid-carrageenans from raw seaweed were extracted sequentially with cold and hot water (F1, F2), acid (F3) and alkali (F4). Composition and structural characterization of polysaccharide fractions was mainly assessed by gas-liquid chromatography, ion chromatography and FTIR-ATR spectroscopy. Moreover, multifunctional antioxidant capacity of soluble polysaccharide fractions was assayed as reducing power by FRAP, while radical scavenging capacity was measured by ABTS and photochemiluminiscent methods. In addition, anticoagulant capacity was measured by intrinsic and extrinsic coagulation pathways: activated partial thromboplastin time (APTT) and prothrombin time (PT) methods, respectively. Monosaccharide composition and FTIR-spectra of polysaccharide fractions from *M. stellatus*, suggested a strong link between extraction procedure and chemical composition of carrageenans. Thus, cold-water extraction (F1) of raw seaweed rendered a higher sulfate content, whereas alkali-treatment (F4) delivered a higher hybridization degree of carrageenans. Different kappa-/iota-hybrid carrageenan fractions from *M. stellatus* showed both significant antioxidant and anticoagulant capacity. A positive correlation between sulfate content either with reduction power or radical scavenging activity was revealed. Also, anticoagulant capacity of the soluble polysaccharide fractions (F1-F4) from *M. stellatus* would confirm the strong role for sulfate in the prolongation time of intrinsic coagulation pathway (APTT). In summary, carrageenans-sulfated-galactans- from the dietary fibre matrix of *M. stellatus* are promising health-promoting agents for nutraceuticals.

**Keywords:** seaweeds, dietary fibre, antioxidant, anticoagulant, sulfated polysaccharide, carrageenan

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