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Abstract

In Vitro Gastrointestinal Digestion Impact on the Antioxidant Activity of Extracts Produced from the Macroalgae *Gracilaria gracilis* and *Ulva rigida* †

Sara A. Cunha [1,*], Paulo Nova [1], Ana S. Salsinha [1,2], Ana Gomes [1] and Manuela Pintado [1]

[1] CBQF—Centro de Biotecnologia e Química Fina—Laboratório Associado, Escola Superior de Biotecnologia, Universidade Católica Portuguesa, Rua Diogo Botelho 1327, 4169-005 Porto, Portugal; pnova@ucp.pt (P.N.); asalsinha@ucp.pt (A.S.S.); amgomes@ucp.pt (A.G.); mpintado@ucp.pt (M.P.)

[2] Instituto de Investigação e Inovação em Saúde and Instituto de Biologia Molecular e Celular (IBMC), Universidade do Porto—Rua Alfredo Allen, 208, 4200-135 Porto, Portugal

* Correspondence: scunha@ucp.pt

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Abstract: The interest in edible algae has been growing over the years due to their richness in molecules with nutritional and bioactive potential, such as proteins, essential amino acids, vitamins and minerals. Furthermore, due to their interesting protein content, they have been described as a source of bioactive peptides, with scientifically documented antioxidant, anti-hypertensive and antimicrobial properties. In this work, water-soluble extracts were produced from the macroalgae *Gracilaria gracilis* and *Ulva rigida*, with focus on their antioxidant potential. Furthermore, the impact of in vitro gastrointestinal (GI) digestion on the antioxidant activity of both extracts was studied, with the goal of evaluating their potential as functional food ingredients. Extracts were produced by enzymatic hydrolysis, with a cellulase and a subtilisin protease, using a previously optimized method. Then, both were submitted to simulated GI conditions, similar to those found in the human digestive system. The antioxidant activity was determined by ORAC and ABTS assays in four stages of GI simulation (before digestion, and after mouth, stomach and intestine digestion). The antioxidant activity did not decrease throughout the different stages of digestion. Interestingly, the antioxidant capacity increased after some phases. For instance, both extracts presented higher ORAC values after all digestion phases, when compared to the non-digested extract, being statistically significant after stomach digestion, for *G. gracilis* extract ($p < 0.05$). On this study, both extracts maintained their antioxidant activity during in vitro GI digestion, with an increase after almost all digestion phases, when compared to the non-digested extract. The observed increase may be explained by the production of smaller and more bioactive peptides, by the action of the gastrointestinal enzymes, such as pepsin and pancreatin. In conclusion, since antioxidant activity is maintained throughout the GI tract, these results showed that *G. gracilis* and *U. rigida* extracts may be considered potential ingredients for the development of functional foods with antioxidant properties.

Keywords: bioactive hydrolysates; functional food; active ingredients; macroalgae; marine species

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