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IN VITRO GASTROINTESTINAL DIGESTION IMPACT ON THE ANTIOXIDANT ACTIVITY OF EXTRACTS PRODUCED FROM THE MICROALGAE CHLORELLA VULGARIS AND NANNOCHLOROPSIS OCEANICA

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Microalgae are rapidly cultivable growing photosynthetic organisms rich in compounds with high biological values, such as antioxidants, with interest for food industry. Although microalgae extracts may present several health benefits, it is necessary to understand if their properties are maintained throughout the gastrointestinal (GI) digestion, after the exposure to enzymes and different pH ranges. Thus, this work studied the impact of in vitro gastrointestinal digestion on the antioxidant activity of extracts produced from the microalgae Chlorella vulgaris and Nannochloropsis oceanica, with the goal of evaluating their potential as functional food ingredients.

Chlorella extract was produced by acid and enzymatic hydrolysis (cellulase and subtilisin) and Nannochloropsis extract by enzymatic hydrolysis (cellulase and subtilisin). Both were submitted to simulated GI conditions. 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).

Both extracts showed increased ORAC and ABTS values throughout the GI digestion. This increase was statistically significant for Chlorella in terms of ABTS values in all phases, and in ORAC after stomach and intestine digestion. For Nannochloropsis, only the increase in ABTS values was statistically different after stomach and intestine digestion ($p<0.05$).

This study showed that both extracts maintain their antioxidant activity throughout in vitro GI digestion, with a little increase being observed, which may be explained by the formation of smaller and more bioactive peptides. These results shows that Chlorella and Nannochloropsis extracts may be considered sustainable antioxidant ingredients for the development of functional food.

Keywords: Bioactive extracts; Functional food; Active ingredients; Sustainable ingredients; Microalgae