Bioactive proteins and enzymatic hydrolysates from *Nitzschia laevis* and their *in vitro* anti-oxidative and antihypertensive activities

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Nitzschia laevis is used to extract highly pure eicosapentaenoic acid (EPA) for commercial use in food and pharmaceutical applications, and the bio-waste is used for animal feed. This research focuses on the aqueous production of bioactive proteins and hydrolysates from the byproduct of EPA production from *N. laevis*. A comparison of antioxidant and antihypertensive activities was established between the extracts of *N. laevis* and other well-known microalgae that are used as food ingredients/supplements. In this study: (1) Proteins were extracted from *N. laevis*, (2) Hydrolysates were produced from proteins extracts using Alcalase®CLEA™, Flavourzyme® and Trypsin, (3) Proteins and hydrolysates were purified and partially characterized and (4) *in vitro* bioactivities were screened using chemical and enzymatic assays. The hydrolysis process enhanced the antioxidant and anti-hypertension activities in general, especially those obtained using Alcalase®CLEA™. *Nitzschia* showed the highest total phenolic content and reducing capacity (2.4±0.02 mg GAE/100 g) after 90 minutes of hydrolysis with Alcalase®CLEA™. Moreover, hydrolysates at 120 minutes showed the highest ABTS scavenging activity (66.77±0.003%), but DPPH was low (29.599±0.024%). A correlation study was established between DPPH and ABTS scavenging activity with total phenolic contents, trypsin hydrolysates showed the highest positive correlation. The antihypertensive activity was significantly enhanced after hydrolysis; Alcalase®CLEA™ hydrolysates of *N. laevis* showed higher ACE inhibition activity after 30 minutes (64.81% ACE inhibition) and Flavourzyme® hydrolysates also showed high activity after 60 minutes (60.81% ACE inhibition) compared to controls. The interactions between proteins and hydrolysates with other residues are likely to contribute to the measured antioxidant and anti-hypertension activities.

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