

Impact of Gastrointestinal Digestion on the Bioactivity and Bioaccessibility of Carotenoids and Phenolic Compounds from Algae

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Introduction:

Algae-derived carotenoids and phenolic compounds are known for their potential health benefits, including antioxidant and anti-inflammatory properties. However, the extent to which these compounds are absorbed and retained in the body after digestion remains unclear. Understanding the digestive processes that affect the bioavailability of these compounds is crucial for maximizing their potential health effects. Research in this field contributes to the development of strategies to enhance the bioavailability and effectiveness of algae-derived bioactive compounds for dietary and therapeutic purposes [1,2].

Results

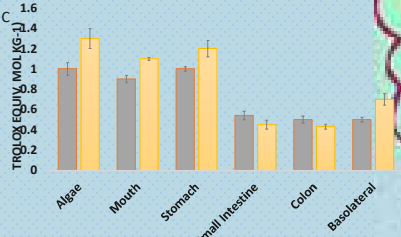
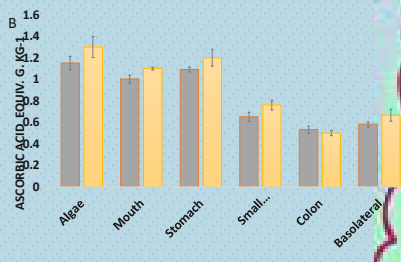
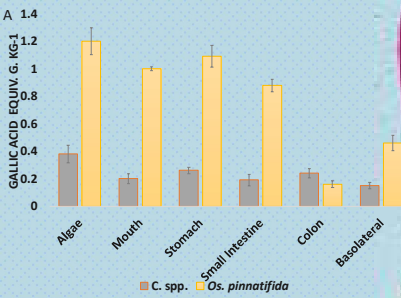


Figure 3. Total phenolic compounds (A), antioxidant activity measured by ABTS (B) and Orac (C) of *Codium* spp., and *Os. pinnatifida* in each stage of gastrointestinal tract.

Conclusions:

- *Codium* spp. algae demonstrated a higher concentration of polyunsaturated fatty acids (PUFA) compared to *O. pinnatifida* algae.
- *Osmundea pinnatifida* exhibited total phenolic compounds content three times higher than that of *Codium* spp..
- The antioxidant activity of *Os. pinnatifida* was higher, measured at 1328.28 ± 75.32 µmol of Trolox Eq./g DW in initial stage of ingestion.
- Also, both algae present antioxidant activity in colon and in the absorption fraction of GITs.
- The phenolic content of basolateral fraction is higher than compared with colon fraction, which corroborate with bioactivities found.

Overall, the *in vitro* simulated gastrointestinal digestion study provides valuable insights into the bioactivity, bioaccessibility, and health implications of carotenoids, including lutein, and phenolic compounds derived from algae, contributing to the understanding of health benefits of these compounds.

References:

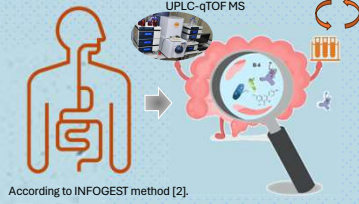
- [1] doi: 10.3390/nu15102265
[2] doi: 10.1038/41596-018-0119-1

Acknowledgements:

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Methodology

Gastrointestinal tract simulation Individual compounds profile Biological properties



Phenolic compounds and carotenoids content (spectrophotometry)
Antioxidant capacity (ORAC, ABTS)
Individual compounds (HPLC, UPLC-Q-ToF)
Fatty acids content (GC)

Recovery rate (%)

Bioaccessibility (%)

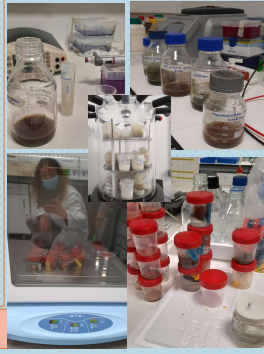


Figure 1. Methodology flow used in study.

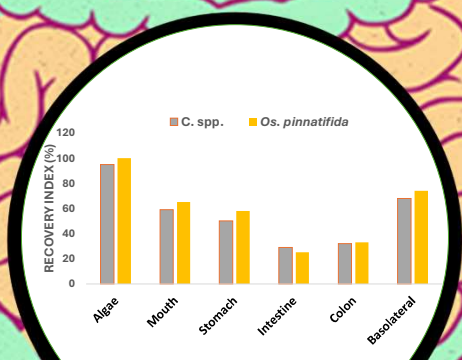


Figure 4. Recovery index of Lutein.

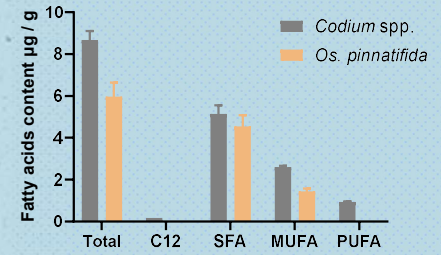


Figure 2. Total concentration of fatty acids and distribution between saturated (SFA), monounsaturated (MUFA) and polyunsaturated (PUFA) fractions (µg/g DW) found in *Codium* spp. and *Os. pinnatifida*.

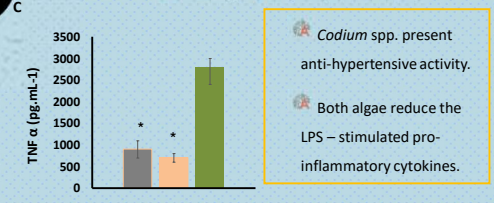
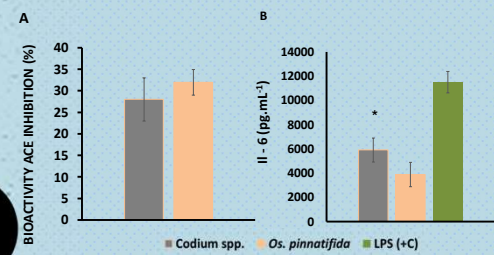


Figure 5. Bioactivity ACE inhibition (%), graph A; Interleukin-6 (IL-6), graph B, tumour necrosis factor- α (TNF- α), graph C, concentration in the supernatants from cells stimulated with a basolateral fraction of *Codium* spp., and *Os. Pinnatifida* algae in combination with 2.5 µg/mL lipopolysaccharide (LPS) per well. The data are expressed as the mean \pm SD (* p <0.05 vs. LPS control).

Codium spp. present anti-hypertensive activity.
Both algae reduce the LPS-stimulated pro-inflammatory cytokines.