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Cytotoxic and antioxidant properties of phlorotannin and fucoxanthin from *Sargassum tenerrimum*

Phlorotannin and fucoxanthin from brown algae exhibit various beneficial biological activities. *Sargassum tenerrimum*, marine brown algae were collected from Gulf of Mannar, Mandapam Island, India. Solvent extraction of phlorotannin and fucoxanthin from *S. tenerrimum* was carried out using chloroform:methanol:water in the ratio 4:2:1. The presence of phenol and fucoxanthin in extracts were analyzed qualitatively by phytochemical screening and confirmed by FTIR analysis. Ferrous Reducing Antioxidant Power (FRAP) of crude phlorotannin and fucoxanthin shows reducing power of 0.098±0.095 and 0.00216±0.00 (g of ferrous sulphate equivalent/g of sample). The IC_{50} values for DPPH radical scavenging activity of phlorotannin was found to be 820.2±36.7 and for fucoxanthin was found to be 726.75±42.1 (µg/ml). Total antioxidant activity of crude phlorotannin and fucoxanthin was found to be 0.12±0.002, 0.56±0.028 g of ascorbic acid equivalent/g of sample), respectively. The results of Total Antioxidant Power (TAP) assay, Ferrous Reducing Antioxidant Power (FRAP) assay and DPPH radical scavenging activity suggested that crude phlorotannin and fucoxanthin had appreciable antioxidant activity. The cell proliferation assay using prostate cancer cell lines (PC3) showed that the IC_{50} value for phlorotannin and fucoxanthin was found to be 58±3.2 µg/mL and 60±2.8 (µg/mL) and the cytotoxicity is dose dependent. The phase contrast microscopic image of the phlorotannin and fucoxanthin treated PC3 cell lines showed shrinkage and other morphological abnormalities. The PC3 cells exhibited cellular DNA fragmentation when treated with the extracted phlorotannin and fucoxanthin and the DNA fragmentation pattern was found to be similar in the treated cells. Western blotting analysis revealed that phlorotannin and fucoxanthin suppressed the expression of BCL-2 (anti-apoptotic protein) and enhanced the expression of Bax (pro-apoptotic protein) with β-actin as a control in treated and control PC3 cells. The present study suggests that phlorotannin and fucoxanthin from marine brown algae could be explored as potential chemotherapeutic agents for anticancer therapy.

Biography

Anant Achary completed his M.Tech. and PhD in Biotechnolog at Anna University, India, Currently he is working at Kamaraj College of Engineering and Technology has a Principal and Professor. Anant Achary has expertise in working on algae from marine environment found abundantly in Indian Coast, more specifically on algae present in Gulf of Mannar, Mandapam Coast, India. He is among the top five scientists pursuing research on native algae. His interest lies in exploring the brown algae as natural alternative for existing heparin like anticoagulants. His research is focused on understanding the nutraceutical potential of brown algae and as adjunct therapy for cancer patients. A study on native species for their diverse biological potential also has commercial value and as a part of his research interests, his group has attempted to enhance their biological potential with biological modifications of existing secondary metabolites from marine algae.

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