

PP 94

Anticancer potential of polyphenol rich crude methanol extract of Sri Lankan marine brown algae *Choonospora minima* against human breast adenocarcinoma (MCF-7) cell line

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Background: Cancer is increasingly a global health issue. The WHO projects that, by 2035, the world could see 24 million new cancer cases and 14.5 million cancer-related deaths a year. According to the cancer registry of Sri Lanka, about 13,635 new cancer incidences have been reported in 2007 and 68% of the population is suffering from different stages of cancer thus increasing the disease burden. Breast cancer is the most leading cancers affecting most women globally. Seaweeds are an important source of bioactive metabolites in drug development and nutraceuticals. *Choonospora minima* is a brown algae that belongs to the family Scytosiphonaceae. Polyphenols purified from brown algae are considered a rich source of antioxidants.

Objective: This study aimed to evaluate the anti-cancer potential of polyphenol rich methanol extract of *C. minima* against human breast adenocarcinoma (MCF-7) cell line.

Method: Homogenized *Choonospora minima* powder (10.0 g) was extracted three times using 70% methanol using sonication method and polysaccharides were separated using 70% ethanol. De-polysaccharide methanol extract (ME) was prepared to determine the cytotoxic and apoptotic effects. The cytotoxic activity was assessed by 3-(4, 5-dimethylthiazolyl-2)-2, 5-diphenyltetrazolium bromide (MTT) assay while apoptotic activity was examined by cell morphological changes, DNA fragmentation and Caspase 3/7 assays. One-way ANOVA was used and $p < 0.05$ was considered significant.

Results: The methanol extract of *C. minima* significantly inhibited cell proliferation in MCF-7 cells in a dose-dependent manner. It showed potent cytotoxic activity (IC_{50} : $197.2 \pm 5.7 \mu\text{g/ml}$) compared to the standard cycloheximide (IC_{50} : $36.2 \pm 1.8 \mu\text{g/ml}$). Similarly, apoptosis morphological features were observed by a phase contrast inverted microscope and Hoechst 33342 staining methods. However, low activation of caspase 3/7 activity was observed in the methanol extract without typical DNA ladder pattern of apoptosis.

Conclusion: The polyphenol rich methanol extract has the ability to suppress cellular proliferation and induce apoptosis mediated cell death in MCF-7 cell line via caspase-independent pathway.

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