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Assessment of cytotoxicity and apoptotic activity of different fractions of *G.edulis* against human rhabdomyosarcoma (RMS) cell line

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Background: Marine seaweeds are a rich source of bioactive metabolites that can be used as an alternative source for the development of the anti-cancer drug.
Objectives: The present study aimed to evaluate the cytotoxicity and apoptotic activity of different fractions of *G.edulis* against the human rhabdomyosarcoma (RMS) cell line.
Methods: De-polysaccharide polyphenol-rich methanol extract of *G.edulis* was sequentially partitioned with hexane, chloroform, and ethyl acetate to determine the cytotoxic and apoptotic effects. The cytotoxic activity was assessed by MTT and neutral red assays while apoptotic activity was examined by cellular morphology, DNA fragmentation, and caspase 3/7 assays.
Results: The results of the cytotoxicity assay showed that the decrease in the percentage of cell viability in a dose-dependent manner as signified by cell death. According to the MTT assay, the hexane (HF; $IC_{50Hexane:}$32.5±2.2 µg/ml) and chloroform fractions (CF; $IC_{50Chloroform}$: 77.1±1.6 µg/ml) exhibited potent cytotoxic activity compared to the standard cycloheximide ($IC_{50:}$ 36.2±1.8 µg/ml). Further, the neutral red assay confirmed the cytotoxic activity of hexane fraction ($IC_{50Hexane}$:33.5±2.3 µg/ml) compared to the standard cycloheximide ($IC_{50:}$ 32.8±0.9 µg/ml). The morphological assessment of apoptosis was confirmed using Hoechst 33342 staining and crystal violet staining. The prominent activation of Caspase 3/7 was observed in the RMS cells treated with hexane and chloroform fractions of *G.edulis* compared to the standard staurosporine and cycloheximide. Similarly, the typical DNA ladder pattern was observed in HF and standard cycloheximide-treated RMS cells.
Conclusion: It can be concluded that the HF of *G.edulis* has the ability to suppress cellular proliferation and induce apoptosis-mediated cell death in RMS cells via a caspase-dependent pathway. Thus, the HF of *G.edulis* can be a potent candidate to isolate the new anti-cancer compounds.

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