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Anticancer activity of anthraquinone isolated from a soil derived filamentous bacterium *Streptomyces* sp. isolate ERINLG-26

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Background: The aims of this study were to investigate the anticancer activity of anthraquinone isolated from a soil derived filamentous bacterium *Streptomyces* sp. isolate ERINLG-26 and to explore the molecular mechanisms of action.

Methods: Isolation of *Streptomyces* sp. (ERINLG-26) was performed by serial dilution using dilution plate technique. Ethyl acetate extract was taken from *Streptomyces* sp. isolate ERINLG-26 in MNGA medium. Anticancer properties of anthraquinone were tested from ethyl acetate extract. Anthraquinone was also tested against COLO320 colorectal adenocarcinoma cell line using the 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyl tetrazolium bromide (MTT) assay. Intracellular visualization was done by using a laser scanning confocal microscope. Apoptosis was measured using DNA fragmentation technique. Activation of p53 and caspase dependent pathway was evaluated in RT-PCR and western blotting analysis. Molecular dockings were performed to investigate the binding modes of anthraquinone into p53 and caspase-3 active sites.

Results: The ethyl acetate extract was subjected to fractionation by column chromatography over silica gel. The isolated compound anthraquinone showed prominent cytotoxic activity *in vitro* against COLO320 colorectal adenocarcinoma cell line. It showed 79.73% activity at the dose of 300 µg/mL with IC₅₀ value of 75 µg/mL. Treatment of the COLO320 cancer cells with isolated anthraquinone significantly reduced cell proliferation, increased formation of fragmented DNA and apoptotic body. The expression of p53 and caspase-3 were up-regulated by anthraquinone in COLO320 colorectal adenocarcinoma cell line. The molecular docking analysis revealed good activity with the ligand anthraquinone with p53 and caspase-3 targets at low energy.

Conclusion: These results strongly suggest that the isolated anthraquinone induces apoptosis in COLO320 cancer cells via caspase activation and the results might provide helpful suggestions for the design of anti-tumor drugs toward colon cancer treatment.

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