A Safer & Greener Prospective Alternative to Chemotherapy: Dittrichia viscosa Silver Nanoparticles' Selective Cytotoxicity Against MCF-7 Breast Cancer Cell Line With Minimal Impact on Healthy Cells

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Based on data from the World Health Organization, in 2020, cancer accounted for 10 million deaths worldwide. Recent studies show promise in using specific metal nanoparticles to selectively target cancer cells. My project is a preclinical study on the selective cytotoxic effect of Dittrichia viscosa Ag NPs against two types of cancer cell lines: (MCF-7 and cancer-associated Fibroblasts). Both have shown cytotoxicity against breast cancer cells individually, but their combined effect remains unexplored. This project seeks to fill this gap and advance breast cancer treatment research. Gradually, the hydroalcoholic Dittrichia viscosa extract was dropped into an AgNO3 3 mM solution in a drop-wise manner. Scanning Electron Microscope was used to confirm the formation of Ag NPs as color change couldn't be recognized because the reaction was performed in the dark, and the color of the plant extract was too dark. The sizes of the Ag NPs ranged from 20 to 30 nm. Ultraviolet spectroscopy was not helpful even at very low concentrations of the solution as the peaks of different phytoconstituents in the plant confused the graph, so the peak of Ag NPs, 400-500 nm, couldn't be recognized well. MTT assay was performed to obtain the IC50 values with 18 mg/ml of the treatment as a stock concentration and 2-fold serial dilutions. Dittrichia viscosa Ag NPs were found to be cytotoxic on both cancer cell lines: the MCF-7 breast cancer cell line and the cancer-associated fibroblasts. Interestingly, the treatment is 10 times more cytotoxic on fibroblasts than it is on the MCF-7 cell line. IC50 value for cancer-associated fibroblasts was 0.02547 mg/ml and 0.2572 mg/ml for MCF-7 cancer cell line. The treatment can be further improved which demands more research.

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