**Fucoidan Nanoparticles as Targeted Drug Delivery System for marine derived anticancer drug Cytarabine in Brest adenocarcinoma cell lines**.

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**Abstract**

Cytarabine, a marine derived anticancer drug, has been widely used for haematological malignancies such as acute myelogenous leukaemia, meningeal leukaemia and Hodgkin's lymphoma. However, this drug has got very limited activity against solid tumours, which demands continuous infusion leading to high dose cytarabine toxicity. One method to improve the therapeutic efficacy is by using a targeted drug delivery system. In our study, fucoidan nanoparticles were used as a delivery system for cytarabine in breast adenocarcinoma cell lines, MCF7. Polyethyleneimine crosslinked fucoidan nanoparticles were synthesised by polyelectrolyte complexation, which was characterised by NMR. Transmission Electron Microscopy (TEM) was used to study nanoparticles' morphology, which showed particle size with an average diameter of less than 50nm. The encapsulation efficiency of the drug was found to be 76 $\pm$ 1.24 %. Cytotoxicity of fucoidan nanoformulation was studied in MCF-7 cell lines by MTT assay. Cell internalisation of the nanoparticles was studied using the fluorophore SQ650. Apoptosis was also analysed by Acridine Orange/ Ethidium Bromide (AO/ EtBr) dual staining. It was found that cytotoxicity and the percentage of cells undergoing apoptosis was higher in cells treated with nanoformulation than the free cytarabine treated group. Hence, the present study confirms that crosslinked fucoidan nanoformulation is an effective drug delivery system for cytarabine in solid tumours.