Anti cancer effects of dendrosomal doxorubicin nanoparticles on Human Breast cancer MCF-7 cells

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Background: Breast cancer is one of the most common cancer and leading cause of mortality in females worldwide. There are several treatment options such as surgery, radiation therapy and chemotherapy. Doxorubicin is an anthracycline primarily used in treatment of cancers such as breast cancer. The use of doxorubicin is limited by significant side effects like cardiotoxicity, nephrotoxicity, hepatotoxicity, and also by its short circulation lifetime. To overcome these obstacles, strategies such as encapsulation of drugs into the polymeric particles have been attempted. Dendrosome is a natural, amphipatic and biodegradable nano-material synthesized by our group and its capacity has been shown in safety delivery drugs into different cell lines. The aim of this study was to investigate that the effects of dendrosomal doxorubicin nanoparticles on MCF-7, human breast cancer cell line.

Methods: We synthesized dendrosomal doxorubicin nanoparticles by solvent evaporation method. The structure of nanoparticle was investigated by DLS, FTIR and TEM. The cytotoxic effects of varying concentrations of free and loaded drug for different time intervals including 24, 48 and 72 hours were determined by MTT assay.

Results: Data analysis of results showed that dendrosomal doxorubicin nanoparticles had dose and time dependent cytotoxic effects on MCF-7 cell line. There was a meaningful difference between cytotoxic effects of free and loaded doxorubicin nanoparticle ($P<0.05$).

Conclusion: The findings of this study showed that dendrosomal doxorubicin loaded nanoparticles has significant effect on MCF-7 human breast cancer cell line and could be considered as a potential agent for treating breast cancer.
Keywords: Breast cancer, doxorubicin, MCF-7, nanoparticle