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Synergistic Effects of Chrysin-Curcumin Loaded in PLGA-PEG Nanoparticles on Inhibiting Breast Cancer Cell Line Growth

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Abstract : Breast cancer is known to be the most common cancer in women. Cyclin D1 is a proto-oncogene and over expression of cyclin D1 is directly associated with tumorgenesis. Cyclin D1 is overexpressed in more than 50% of breast cancer cases. Curcumin is derived from turmeric (curcuma longa) and chrysin is a component that could be extracted from many plants and honey. These two plants derived compounds are believed to assist in inhibition of the cancer cells growth and reducing cyclin D1 expression. In this work, the hypothesis is to combine curcumin and chrysin in order to analyze the potential synergistic effect in inhibition of cell proliferation and down regulation of cyclin D1. In addition, use of PLGA-PEG to improve bioavailability of pure curcumin and chrysin, while reinforcing the potential effect of this combination. PLGA-PEG nanoparticles were synthesized and characterized with FT-IR and 1HNMR methods. Although morphological features were analyzed by SEM. Afterward curcumin and chrysin were encapsulated with synthesized PLGA-PEG and MTT-assay was performed to measure cytotoxicity effect of these plant constitutes. T-47D cells were treated with proper concentration of these constituents and Real-time PCR was carried out to evaluate cyclin D1 expression levels. Curcumin, chrysin and combination of curcumin –chrysin in intact and nano-capsulated form affected T-47D cells in time and dose dependent manner and the combination of these compounds had synergistic effects. Real-time PCR results, revealed that curcumin, chrysin and combination of curcumin-chrysin in pure and encapsulated form inhibited cyclin D1 expression. Compared to pure components, different concentrations of nano-curcumin, nano chrysin and nano-combination caused further decline in cyclin D12 expression by 5-11%, 8-22% and 6-18% respectively. Our results demonstrated that, combination of chrysin-curcumin had synergistic effect and nano capsulated form of this component had grater inhibition on cyclin D1 expression.

Keywords : breast cancer, cyclin D1, curcumin, chrysin, nanoparticles
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