

Development and Evaluation of Mitoxantrone-Loaded Polyquercetin Nanoparticles and their Potential Synergism with other Anticancer Agents

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Abstract

Nanoparticles (NPs) have shown great potential in the treatment of many illnesses, including cancer. This study aimed to develop a novel NP formulation for the anticancer agent mitoxantrone (MTZ) by loading it into a newly developed polymer, polyquercetin (pQCT), both by itself and in combination with other anticancer agents such as methotrexate (MTX), curcumin (CUR), and thymoquinone (TQ). The optimal MTZ NPs were monodispersed with an average diameter of 128nm, polydispersity index (PDI) of 0.20, and drug loading efficiency was 76%. The NPs exhibited good stability upon storage and by adding surfactants. It also achieved good sustained release for up to 96h. NPs demonstrated potent cytotoxicity in vitro against breast cancer cell lines, which was significantly enhanced in the presence of MTX, CUR, and TQ. Our research provides a promising nanocarrier platform for MTZ with the potential to enhance its bioactivity when combined with other anticancer agents.

Keywords: Breast cancer, Mitoxantrone, Nanomedicine, Polymeric nanoparticles, Polyquercetin.