

Green synthesis of silver nanoparticles loaded in DOX-PDLLA nanoparticles for synergistic anticancer activity

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Abstract

Silver nanoparticles have become one of the most attractive nanomaterials for biomedical application, especially those synthesized through herbal medicinal plants, due to their variety of pharmacological importance and their significant antimicrobial and anti neoplastic properties. We aimed to synthesize silver nanoparticles using simple and eco friendly technique. To be then combined with doxorubicin in order to maximize its neoplastic activity and to reduce its cardio toxicity. In this study, we prepared silver nanoparticles by treating silver ions with rutin as reducing agent. The reaction process was simple and convenient to handle, and was monitored using ultraviolet-visible spectroscopy (UV-vis). Then the prepared AgNPs were encapsulated into PDLLA nanoparticles along with Doxorubicin. The release profile of the doxorubicin from the polymer nanoprticles was established and analyzed using UV spectroscopy. Finally, the anti cancer activity of the developed formula (AgNP- DOX loaded PDLLA) against hella and HepG2 cancer cells was tested. The combination of silver nanoparticles with doxorubicin has a synergistic effect regarding the anti cancer activity. The results showed that the killing activity of the doxorubicin got a significant increase when combined to Ag nanoparticles. The anti oxidant activity of the Ag nanoparticles and rutin would play an important role in decreasing the cardio toxic effect of doxorubicin free radicals. Moreover, the in vitro release study of the AgNPs – DOX loaded PDLLA for 30 hours showed a sustained release profile of doxorubicin.