

البحث السادس

The effects of rutin coat on the biodistribution and toxicities of iron oxide nanoparticles in rats

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Abstract

Rutin (Ru) is a flavonol glycoside, has significant scavenging characteristics against various reactive oxygen species, which exploits for widespread pharmacological activities such as anti- inflammatory and anti-allergic effects. This study aims to improve the bioavailability of iron oxide nanoparticles (IONPs) by coating them with Ru (Ru-IONPs). Considering this, IONPs and Ru- IONPs were prepared and characterized via various physical techniques. In addition, atomic absorption spectroscopy (AAS) has been used to assess the bio-distribution of the prepared formulation in vivo. Results revealed that the prepared IONPs and Ru-IONPs have a spherical shape with an average diameter of about 8nm and 10 nm, respectively. Their surface potentials were found to be -19 ± 3.9 and -29.5 ± 5.4 mV, respectively. In vivo results revealed that single dose of IV administration of IONPs (16 mg/kg) elevated oxidative stress, indicated by the reduction of GSH in both heart and liver tissues, and increased their MDA contents. Also IONPs administration resulted in hepatotoxicity characterized by a significant increase in ALT and AST levels in addition to cardiotoxicity characterized by a significant increase in CK-MB and LDH. In addition to the downregulation of heat shock protein 70 (HSP70) expression, while upregulation of TNF- α expression in both heart and liver tissues. Conversely, nearly all of these alterations were significantly ameliorated for animal groups administrated Ru-IONPs and the morphological injury's counteraction in both heart and liver tissues. Therefore, we suggest that Ru could be used to alleviate the harmful effects and damages associated with IONPs administration due to its antioxidant, anti-inflammatory, and free radical scavenging properties.

KEYWORDS: Iron oxide nanoparticles; Rutin; iron biodistribution; TNF- α ; Heat shock protein 70; and oxidative stress.