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Ameliorative effect of quercetin and idebenone against oxidative stress, inflammation, DNA damage and apoptosis induced in rat livers after oral exposure to titanium dioxide nanoparticles

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Abstract

The aim of the present study is to investigate the prophylactic effect of either quercetin or idebenone against toxicity of titanium dioxide nanoparticles (TiO2-NPs) induced liver tissue damage in rats. TiO2-NPs were administered orally using either two doses (600mg or 1g/ Kg body weight/day for 5 consecutive days). Our results showed that the administration of the quercetin or idebenone (200mg/Kg body weight daily for three weeks) to TiO2-NPs intoxicated rats was effective in reducing the oxidative liver tissue damage. This was evident by the decrease in the level of lipid peroxidation enhanced in rat liver by either the two doses of TiO2-NPs coupled with a decrease in the elevated serum alanine amino-transferase (ALT). Also the two agents significantly down-modulated the dramatic increase in serum glucose level (marker of metabolic disorder) and the pro-inflammatory biomarkers including tumor necrosis factor- α (TNF-α), interleukin-6 (IL-6), C-reactive protein (CRP), and immunoglobin g (IGg) as well as the induced vascular endothelial growth factor (VEGF) (angiogenic factor) and nitric oxide (NO) in TiO2-NPs intoxicated rats compared with control. In addition, the used agents successfully ameliorated the oxidative (DNA) damage, the alteration in the apoptosis marker, Caspase-3 and the drug metabolizing enzymes, cytochrome P450 (CYP 450) in rat livers in response to the toxicity of either the two doses of TiO2-NPs. Histopathological examination of Liver tissue supported these biochemical findings. These results support the use of quercetin and idebenone as protective agents against TiO2-NPs toxicity induced liver tissue damage.

Biography

Laila M Fadda has completed his Ph.D at the age of 35 years from Cairo University and postdoctoral studies from Minia University School of Medicine (Egypt). I was dean of faculty of pharmacy. Now I am working as a professor in King Saud University- Pharmacy collage - Pharmacology Depart- Riyadh - Saudi Arabia. I had sixty papers some of them were published in ISI journals.