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Hesperidin prevents lipopolysaccharide-induced endotoxicity in rats

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Abstract

Context: Lipopolysaccharide (LPS) is a major trigger of septic shock resulting in multiple organ damage through excessive stimulation of the host's immune cells resulting in the release of cytokines. Previous studies have shown that hesperidin has several beneficial properties against inflammation and oxidative stress.

Objective: The influence of hesperidin on endotoxemia, endothelial dysfunction, inflammation, and oxidative stress was investigated using a murine model of sepsis.

Materials and methods: Rats were pretreated for 15 d with three doses (50 mg/kg, 100 mg/kg, and 200 mg/kg) of hesperidin prior to LPS administration. Afterwards, the levels of biomarkers of endotoxemia, endothelial dysfunction, and oxidative stress were assessed. Reverse transcriptase PCR technique was used to assess the expression of hepatic proinflammatory cytokines.

Results: Hesperidin pretreatment significantly ($p < 0.05$) reduced circulating endotoxin, as well as the levels of bactericidal permeability increasing protein and procalcitonin, and the

associated endothelial dysfunction by reducing the levels of plasma soluble intercellular adhesion molecules 1 and inducible nitric oxide (iNO) synthase. There was also down-regulation of the expression of gene for interleukin 1α, interleukin 1β, interleukin 1 receptor, interleukin 6, and tumor necrosis factor α (TNFα) in the liver of rats treated with LPS as a result of hesperidin pretreatment. Hesperidin also showed anti-oxidative properties through the significant ($p < 0.05$) reduction of NO, hydroperoxides, and thiobarbituric acid reactive substances and increase of glutathione, glutathione reductase, glutathione peroxidase, and glutathione-*S*-transferase in the organs.

Conclusion: Different doses of hesperidin can prevent endotoxemia-induced oxidative stress as well as inflammatory and endothelial perturbation in rats when administered for as few as 15 d before exposure to endotoxin.

Keywords: Lipopolysaccharide, anti-inflammatory, anti-oxidative, endothelial dysfunction, hesperidin

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