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Effect of resveratrol on antioxidants in diabetic mice

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Abstract

Diabetes mellitus (DM) is characterized by chronic hyperglycemia, resulting from defects in insulin secretion, action, or both, leading to disturbance in carbohydrate, lipid and protein metabolism. This state induces immediate oxidant stress and free radicals which trigger oxidative stress-linked diabetic complications. Resveratrol (RSV) (3,5,4'-trihydroxystilbene) is a natural polyphenol present in various foodstuffs, mainly in grapes where it is synthesized in response to environmental stress conditions. Many studies have demonstrated that this molecule exhibits a wide range of biological and pharmacological activities both in vivo and in vitro. A series of studies showed that resveratrol has anti-oxidant properties, anti-inflammatory properties, and anticancer activity.

The present study was to investigate the effect of resveratrol on alloxan-induced diabetic mice, through analysis of basic biochemical parameters, enzymic as well as non-enzymic activities – superoxide dismutase (SOD), catalase (CAT) and reduced glutathione (GSH).

The experiments were carried out male mice, average body weight 25 – 26g, bred in the constant light conditions LD 12:12 and fed with standard diet with unlimited access to water. Male mice were divided into four groups (n = 6): normal control, diabetic control, normal rats treated with resveratrol, and diabetic rats treated with resveratrol. Alloxan was administered as a single dose (75 mgKg⁻¹ body weight) to induce diabetes in mice. A dose of resveratrol (Sigma Aldrich, St. Louis, MO, USA) (20 mgKg⁻¹ body weight/for 14 days) were administered orally, to the alloxan-induced diabetic mice. Thirty minutes after the last injection animals were anaesthetized and decapitated. The blood samples were collected from the carotid artery. All blood samples were processed immediately and frozen at minus 70 degrees centigrade until assay.

In animals, the control group average of enzyme activity was respectively: SOD=21,61 U/mg protein; CAT=50,13 U/mg protein and level of GSH=1,93 μM/ml blood. The levels of antioxidants were significantly decreased in blood serum in alloxan-induced diabetic mice. A significant ($p<0.05$) reduction in SOD=14,27 U/mg protein; CAT=38,34 U/mg protein and level of GSH=1,14 μM/ml blood are observed in diabetic group as compared to control mice. After resveratrol administration, there were increases in superoxide dismutase ($p<0.001$), catalase ($p<0.001$) activities and reduced glutathione ($p<0.01$) concentration compared to diabetes mice.

Treating the diabetic mice with doses of resveratrol restored the changes in the above parameters analyzed. The present study, showed that resveratrol exerted antioxidant effects, consequently alleviate damage caused by alloxan-induced diabetes

Keywords: resveratrol, oxidative stress, diabetes, mice