Alleviation of oxidative damage in multiple tissues in rats with streptozotocin-induced diabetes by rice bran oil supplementation

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Abstract

Abstract: The possibility of 8-hydroxy-2'-deoxyguanosine (8-OHdG) serving as a sensitive biomarker of oxidative DNA damage and oxidative stress was investigated. Reactive oxygen species (ROS) have been reported to be a cause of diabetes induced by chemicals such as streptozotocin (STZ) in experimental animals. In this study, we examined oxidative DNA damage in multiple tissues in rats with STZ-induced diabetes by measuring the levels of 8-OHdG in the liver, kidney, pancreas, brain, and heart. Levels of 8-OHdG in mitochondrial DNA (mtDNA) and nuclear DNA (nDNA) were also determined in multiple tissues of rats treated with rice bran oil. Levels were 0.19 ± 0.07, 0.88 ± 0.30, 1.97 ± 0.05, and 9.79 ± 3.09 (1/105 dG) in the liver of nDNA of normal rats, nDNA of STZ-induced diabetic rats, mtDNA of normal rats, and mtDNA of STZ-induced diabetic rats, respectively. Levels of mtDNA of 8-OHdG were 10 times higher than those of nDNA in multiple tissues. Significant reductions in mtDNA 8-OHdG levels were seen in the liver, kidney, and pancreas of diabetic rats treated with rice bran oil compared with diabetic rats without intervention. Our study demonstrated that oxidative mtDNA damage may occur in multiple tissues of STZ-induced diabetics rats. Intervention with rice bran oil treatment may reverse the increase in the frequency of 8-OHdG.