



The antioxidant effect of hesperetin and nano-hesperetin on activity of catalase and superoxide dismutase enzymes in the hippocampus of animal model of Parkinson's disease

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Background and objectives: Hesperetin flavanone is a natural bioflavonoid found abundantly in citrus fruits with antioxidant and anti-inflammatory properties. Nano sizing techniques improve the bioavailability of poorly soluble drugs such as hesperetin. Main feature of Parkinson's disease is the degeneration of dopaminergic neurons in the substantia nigra. The rate of oxidative damage increases during Parkinson's disease, as the efficiency of antioxidant and repair mechanisms decreases. The purpose of this study was to investigate the beneficial potential of hesperetin and nano-hesperetin on the activity of catalase and superoxide dismutase antioxidant enzymes in the animal model of Parkinson's disease.

Methods: Forty nine male rats were divided into 7 groups. All groups except the control group and vehicle with unilateral injection of 6-hydroxydopamine to striatum were converted to Parkinson's models. The four treatment groups received 5 and 10 mg/kg hesperetin and nano-hesperetin per day orally for four weeks. Then, at the end of the fourth week, the activity of catalase and superoxide dismutase in the hippocampus area was measured.

Results: The results showed that intra-striatal injection of 6-hydroxydopamine significantly ($p < 0.001$) reduced the activity of catalase and superoxide dismutase enzymes versus control group, while in lesion groups treated with hesperetin and nano-hesperetin enhanced significant activity of this antioxidant enzymes compared with 6-hydroxydopamine-lesion group was observed. **Conclusion:** Hesperetin and nano-hesperetin with their protective and antioxidant effects could significantly increase the activity of antioxidant enzymes such as catalase and superoxide dismutase, as well as decrease the oxidative stress in the hippocampus of animal model of Parkinson's disease.

Keywords: antioxidant enzymes, hesperetin, 6-hydroxydopamine, nano-hesperetin, oxidative stress