Pharmacological Reports
2008, 60, 706–715
ISSN 1734-1140

Prolonged pretreatment with carvedilol prevents 3-nitropropionic acid-induced behavioral alterations and oxidative stress in rats

Puneet Kumar, Anil Kumar

Pharmacology Division, University Institute of Pharmaceutical Sciences, Panjab University, Chandigarh-160014, India

Correspondence: Anil Kumar, e-mail: kumaruips@yahoo.com

Abstract:
3-Nitropropionic acid (3-NP)-induced neurotoxicity causes a cellular energy deficit and oxidative stress *via* an irreversible inhibition of the mitochondrial enzyme succinate dehydrogenase (SDH). Systemic administration of 3-NP causes motor and cognitive deficits, particularly those associated with excessive free radical generation. Recently, carvedilol has been implicated as a neuroprotectant in the treatment of various neurological disorders. The present study was designed to investigate the neuroprotective effects of carvedilol against 3-NP-induced cognitive impairment and oxidative damage in rats. Intraperitoneal administration of 3-NP (20 mg/kg for 4 days) caused significant body weight reduction, impaired motor function (locomotor activity, movement pattern), induced vacuous chewing movements, led to poor retention of memory in the Morris water maze, and elevated plus maze task paradigms. Chronic treatment with carvedilol (1 and 2 mg/kg, *po*), once daily for a period of 8 days beginning 4 days before 3-NP administration, significantly reversed 3-NP-induced motor impairment and cognitive deficits. However, carvedilol (1 and 2 mg/kg, *po*) treatment significantly attenuated oxidative damage (reduced lipid peroxidation and nitrite levels, and restored depleted reduced glutathione and succinate dehydrogenase enzyme activity) in the rat brain. The results of the present study suggest that carvedilol has a neuroprotective effect against 3-NP-induced behavioral alterations and oxidative damage.

Key words:
carvedilol, motor activity, 3-nitropropionic acid, oxidative stress