

Beneficial Effects of Piperine on Spatial Memory Impairment and Brain Lipid Peroxidation Increase Induced by Transient Cerebral Ischemia in Mice

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Abstract

Effects of piperine, a major pungent alkaloid in pepper, on the cognitive deficit and cerebral oxidative stress induced by cerebral ischemia were studied in mice by using spatial memory task and measurement of lipid peroxidation in the brain. Transient cerebral ischemia was induced by 20-min bilateral common carotid artery occlusion (2VO) and the impairment of spatial learning and memory was subsequently evaluated for 5 consecutive days by a Morris water maze. The 2VO-mice displayed a delay in swimming time to find a hidden platform (escape latency) when compared to sham-operated mice. The 5-day intraperitoneal (i.p.) administration of piperine, at 0.1 and 0.5 mg/kg/day after the 2VO, markedly attenuated this cognitive deficit while the same administration at higher doses (1 and 5 mg/kg/day) showed lower preventive effect on the deficit. Beneficial effects of piperine on spatial memory task were also found in normal and sham-operated mice. However, the magnitude of effects was relatively small comparing to that observed in 2VO mice. In addition, 5-day piperine administration at all test doses did not show any significant effects on locomotor activity of normal mice.

The brain lipid peroxidation (as measured by TBARS assay) of 2VO-mice at 5 days after the occlusion was significantly increased when compared to sham-operated mice. This increase was markedly attenuated by 5-day i.p. administration of piperine at 0.1 and 0.5 mg/kg/day while the same administration at higher doses (1 and 5 mg/kg/day) showed modest attenuation on the increase. Moderate beneficial effects of piperine on brain lipid peroxidation were also noticed in sham-operated mice.

Taken together, these results suggested that piperine administration had beneficial effects on 2VO-induced cognitive deficit and brain lipid peroxidation increase in mice. The close correlation between effects of piperine on both indications of brain injury also implied that the attenuation of 2VO-induced cognitive deficit may involve, at least partly, the antioxidant property of piperine. Conceivably, piperine may be considerable for further study as a possible adjunctive medication in the treatment of neurodegenerative disorders.

Keywords: piperine, cerebral ischemia, memory deficit, lipid peroxidation