Effects of Piperine on Lipopolysaccharide-Induced Injuries and Oxidative Changes in Cultured Glial Cells from Rat Brains

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Abstract

Oxidative stress plays a role in the aging process and is one of the pathogenic causes in a variety of neurodegenerative disorders. In this study, effects of piperine on lipopolysaccharide (LPS)-induced injuries and oxidative changes in cultured glial cells from rat brains were investigated. Treatment of cultured glial cells with low concentrations of piperine (1-10 μM) significantly increased mitochondrial metabolic activity (as measured by MTT reduction) after 12 and 24 hr of incubation. At higher concentrations (25-100 μM), however, piperine markedly decreased mitochondrial activity and cell viability after 6, 12 and 24 hr of incubation. Exposure of cultured glial cells to LPS (1 μg/ml) for 96 hr inhibited mitochondria activity by approximately 30% with no apparent effects on cell survival. Treatment with piperine (5 and 7.5 μM) or trolox (100 μM) for 24 hr after 96 hr of LPS exposure significantly boosted up mitochondrial activity of glial cells. Postincubation with 5 μM of piperine or 100 μM of trolox reversed LPS-induced glutathione diminution by 15% and 24%, respectively. Neither piperine (5 μM) nor trolox (100 μM) affected LPS-induced nitrite accumulation in cultured glial cells. These results suggested that piperine, especially at low concentrations, might have stimulatory effect on glial cell metabolic activity and facilitate glial cell function in brain inflammatory responses.

Keywords: piperine, lipopolysaccharide, cell injury, oxidative changes, cultured glial cells