Original Article

Elucidation of molecular mechanism involved in neuroprotective effect of Coenzyme Q10 in alcohol-induced neuropathic pain

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alcoholic neuropathy; Coenzyme Q10; interleukin-1β; interleukin-4; motor nerve conduction velocity; Na^+ K^+ATPase; gamma; sensory nerve conduction velocity; tumor necrosis factor α

Abstract

The aim of the present investigation was to evaluate the effect of Coenzyme Q10 and its combination with vitamin E in alcohol-induced chronic neuropathic pain. Male Wistar rats were orally treated with alcohol (10 g/kg, 35% v/v, b.i.d.) for 10 weeks. Coenzyme Q10 (25, 50, and 100 mg/kg) and vitamin E (100 mg/kg) were coadministered orally for 1 h after ethanol administration for 10 weeks. Various nerve functions, biochemical, and molecular parameters were assessed. Chronic administration of ethanol for 10 weeks resulted significant development of neuropathic pain. Treatment with Coenzyme Q10 (50 and 100 mg/kg) for 10 weeks showed significant and dose dependently increased in level of nociceptive threshold, endogenous antioxidant, and Na,K-ATPase enzyme. Coenzyme Q10 (50 and 100 mg/kg) significantly restored the levels of motor nerve conduction velocity and sensory nerve conduction velocity. It also showed significant decrease in levels of endogenous calcium, oxidative–nitrosative stress, TNF-α, IL-1β, and IL-4 level. Alteration in protein expression of polymerase gamma (pol γ) was significantly restored the Coenzyme Q10 treatment. The important finding of the study is that, Coenzyme Q10 (100 mg/kg) and α-tocopherol (100 mg/kg) combination-treated rats showed more significant prevention of behavioral, biochemical, and molecular neurotoxic effect of alcohol administration than Coenzyme Q10 or α-tocopherol alone treated group. It is evident from the finding of present investigation that plethora of mechanism including inhibition of oxido-nitrosative stress, release of pro-inflammatory cytokine, modulation of endogenous biomarker, and protection of pol γ protein expression simultaneously orchestrate to exhibits neuroprotective effect of Coenzyme Q10, vitamin E and their combination.

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