

Abstract

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Effect of coenzyme Q10 on ischemia and neuronal damage in an experimental traumatic brain-injury model in rats.

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BACKGROUND: Head trauma is one of the most important clinical issues that not only can be fatal and disabling, requiring long-term treatment and care, but also can cause heavy financial burden. Formation or distribution of free oxygen radicals should be decreased to enable fixing of poor neurological outcomes and to prevent neuronal damage secondary to ischemia after trauma. Coenzyme Q₁₀ (CoQ₁₀), a component of the mitochondrial electron transport chain, is a strong antioxidant that plays a role in membrane stabilization.

METHODS: In this study, the role of CoQ₁₀ in the treatment of head trauma is researched by analyzing the histopathological and biochemical effects of CoQ₁₀ administered after experimental traumatic brain injury in rats. A traumatic brain-injury model was created in all rats. Trauma was inflicted on rats by the free fall of an object of 450 g weight from a height of 70 cm on the frontoparietal midline onto a metal disc fixed between the coronal and the lambdoid sutures after a midline incision was carried out.

RESULTS: In the biochemical tests, tissue malondialdehyde (MDA) levels were significantly higher in the traumatic brain-injury group compared to the sham group ($p < 0.05$). Administration of CoQ₁₀ after trauma was shown to be protective because it significantly lowered the increased MDA levels ($p < 0.05$). Comparing the superoxide dismutase (SOD) levels of the four groups, trauma + CoQ₁₀ group had SOD levels ranging between those of sham group and traumatic brain-injury group, and no statistically significant increase was detected. Histopathological results showed a statistically significant difference between the CoQ₁₀ and the other trauma-subjected groups with reference to vascular congestion, neuronal loss, nuclear pyknosis, nuclear hyperchromasia, cytoplasmic eosinophilia, and axonal edema ($p < 0.05$).

CONCLUSION: Neuronal degenerative findings and the secondary brain damage and ischemia caused by oxidative stress are decreased by CoQ₁₀ use in rats with traumatic brain injury.

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