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The neuroprotective effect of Tocotrienol in chronic cerebral hypoperfusion-induced neurodegeneration in rats

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Introduction: Reduced cerebral blood flow (CBF) is associated with aging and neurodegenerative disorders. CBF-induced neurodegeneration is related with the formation of reactive oxygen species (ROS), which is fatal to neurons at high concentration. To study the neuropathological consequences of a reduced CBF, a similar condition has been created in rats by common carotid artery occlusion (2 vessel occlusion, 2VO). Since vitamin E is known to be a potent antioxidant, the present study, therefore, was designed to assess the effects of vitamin E as an antioxidant and neuroprotective agent in 2VO rat model.

Materials & Methods: After acclimatization, twenty four Sprague Dawley rats weighing 200-250 g were equally divided into three groups. Group A: Sham control, Group B: 2VO and Group C: 2VO+E (treated daily with Vit E, 100 mg/kg, orally following 2VO). On the 8th week, all the rats were euthanized and the hippocampi were isolated. Viable neuronal cell count in the hippocampal CA-1 region was estimated. The Isoprostane F2 (Iso-F2) levels were also measured in the brain homogenates to quantify the oxidative stress levels.

Results: There was significant difference in neuronal cell death in 2VO group as compared to sham group. In 2VO+E rats, the viable neuronal cell count of the hippocampal CA-1 region was significantly higher ($p<0.05$) as compared to the 2VO group. Moreover, Iso-F2 levels in 2VO group was significantly higher ($p<0.05$) as compared to 2VO+E group, implying high oxidative stress in 2VO group and reduction of oxidative stress levels in 2VO+E group.

Conclusion: This study clearly demonstrates the effectiveness of Vit E as a neuroprotective and antioxidant agent in chronic cerebral hypoperfusion induced-neurodegeneration in rats.

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