Protective Effect of Alpha-Lipoic Acid on Neuronal Degeneration Due to Sciatic Nerve Transection in Rat

Somayye Mohammadi-Abisofla*, Morteza Behnam-Rassouli, Maryam Mousavinezhad, Naser Mahdavi-Shahri

Department of Peripheral Nerve Regeneration Research Lab, Rayan Center for Neuroscience and Behavior of Biology, Faculty of Science, Ferdowsi University of Mashhad, Mashhad, Iran

Abstract

Peripheral nerve injury induces inflammation and oxidative stress, which are the most significant causes of the neuronal death. Alpha Lipoic acid (α-LA) as a potent antioxidant and anti-inflammatory agent may counteract the oxidative stress and inflammatory response. This study was designed to investigate the protective effect of α-LA on neuronal cell death in L4 dorsal root ganglion (L4-DRG) induced by unilateral sciatic nerve transection (SNT) in rat. Thirty male Wistar rat were divided into 5 groups (n=6); control (intact), SNT+ Salin, SNT + α-LA (100 mg/kg; i.p), SNT+ vitamin C (150mg/kg: i.p) and sham. Treatment was started 1 hour after injury and continued up to 7th-day post-injury. At 21st day post-injury, the L4-DRG were dissected out, fixed (formalin 10%), processed for paraffin embedding. Serial sections of L4-DRGs were prepared, stained (H&E and Toluidine blue) and then examined microscopically. The mean volume of L4-DRGs was estimated using Cavalieri principle and neurons count was done using a stereological technique (Disector method). Data were analysed with SPSS statistics 16.0 software ANOVA and intergroup comparisons performed using a Tukey-Post hoc analysis. In comparison with control, the number of neurons in SNT + α-LA and sham groups had no significant differences. The number of neurons in the SNT+Salin and SNT+ vitamin C were significantly reduced (P<0.05). α-LA (100 mg/kg,bw) provides comparable protection of sensory neurons after axotomy unlike vitamin C in rats. It seems that α-LA is a profound neuroprotective and promising anti-inflammatory agent in healing peripheral nerve injury.

Keywords: Alpha Lipoic Acid, Peripheral Nerve Injury, Inflammation, Oxidative Stress

*Corresponding Author: Somayye Mohammadi-Abisofla
Email: somaiie-mohammadi@yahoo.com