

Effect of selegiline on the hippocampal ischemia-reperfusion injuries and cognitive impairments following global ischemia in male rats

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Abstract:

Introduction: Selegiline, a selective monoamine oxidase type B inhibitor, has been shown to have neurotrophic and anti-apoptotic properties and to protect neurons in experimental models of cerebral ischemia. The aim of this study was to investigate whether selegiline could enhance cognitive and functional recovery in stroke disease. Selegiline is a drug that has demonstrated antioxidant and neuroprotective effects, as documented in the permanent middle cerebral artery occlusion model in rats. Widely used in the treatment of Parkinson's disease and in recent studies showed anti-inflammatory and anti-apoptotic properties. It has been shown to reduce total brain damage after transient hypoxia– Ischemia.

Methods and Results: The male rats were randomized into four groups: Control groups, Control + Selegiline (2 mg/kg), stroke induction groups and stroke+ Selegiline (2 mg/kg). Selegiline was gavaged after 4 days from beginning of the investigation. In this regard, we tested whether 1) Administration of selegiline is able to inhibit abnormality behaviors related to global ischemia in Male Rats 2) Behavioral changes are associated with mitochondrial dysfunction in the hippocampus and 3) Administration of selegiline is able to alter immune-inflammatory factors in the hippocampus. Therefore, using valid and qualified behavioral tests for the assessment of stroke like behaviors such as novel object recognition test (NOR) were used for confirmation of stroke induction in rats. Then, animals were sacrificed and hippocampi were dissected out and stored at -80 °C. The samples were divided into two different groups; first set of samples were used for preparation of tissue homogenate, on which measurement of oxidative stress parameters and nitrite levels were performed. The second set of samples were fixed in 10% formalin, sectioned, and stained with hematoxylin and eosin (H&E) for pathological evaluations. The statistical analysis showed a significant improvement in most neuropsychological tests after two weeks in the study group.

Conclusions: Data on experimental models of cerebral ischemia have suggested a marked activation of the nigrostriatal dopaminergic system by selegiline that might contribute to the protection against ischemia-induced neurodegeneration.

Key words: Global ischemia, Rat, Selegiline, Stroke.