The Neurotrophic Effect of Tacrolimus (FK506) on Pyramidal Cells of Brain Cortex Following Global Ischemic/Reperfusion in Wistar Rat

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Background

Cerebral ischemia is known as a major problem in the world. Transient global cerebral ischemia causes loss of pyramidal cells of brain cortex following global ischemic/reperfusion. Recently, using immunophilin ligands has been considered as a potential and appropriate strategy for neuroprotection. Since it was observed that tacrolimus (FK506), a useful immunosuppressant used in organ transplantation, provides neuroprotection and prevents neuronal damage,the importance of immunophilins in the development of neuroprotectors has emerged.

Aims & Objectives

To investigate the neurotrophic effect of immuno-suppressant agent FK506 in rats after global cerebral ischemia.

Material & Methods

Animals (n=25) were assigned to control (intact), ischemia and 3 FK506 treated (1,3,6 mg/kg) groups. Both common carotid arteries were occluded for 20 minutes followed by reperfusion. In 3 experimental groups, FK506 was given as a single dose exactly at the time of reperfusion respectively as 1,3,6 mg/kg by intravenous administration(IV).

The same doses (1,3,6 mg/kg) repeated by intraperitoneally administration (IP) 48 hours after reperfusion.

After 4 days the rats were sacrificed and brain sections were stained with Nissl.

Results

Our findings showed that 20 min ischemia decreased the number of the cortex pyramidal cells. But there were no significant differences between number of cortex pyramidal cells in both control and FK506 (6mg/kg) groups.

Conclusions

Our study suggests that tacrolimus has a neurotrophic effect on pyramidal cells of brain cortex and may candidate for treatment of ischemia brain damage.

Keywords: Neurotrophic; FK506; Brain cortex; Pyramidal cell.