Effects of the combination therapy with enalapril and normobaric oxygen on brain injury and neurological outcome following brain ischemia in experimental model of transient focal cerebral ischemia in rats

Abstract

Background & objective: Stroke as an important leading cause of death and disability in human communities has complex pathophysiology. Previous studies have shown that combination therapy with interventions that act via different mechanisms can produce amplified protective effects and decrease incidence of adverse effects. We examined the effects of post-ischemic combination therapy with enalapril and normobaric oxygen (NBO) therapy on neurological outcome and cerebral infarction in a rat model of ischemic stroke.

Methods: Male Sprague-Dawley rats were divided into five main groups (n=8), sham, control ischemic, enalapril treated (0.03 mg/kg), normobaric oxygen treated (3L/min for 90min) and combined treated ischemic groups. Transient focal cerebral ischemia was induced by 90-min-long occlusion of the left middle cerebral artery followed by 24-h-long reperfusion. Neurological deficit score was evaluated at the end of the reperfusion period with Longa test. Measurement of the infarct volumes were assessed by TTC method.

Results: Induction of cerebral ischemia in the control group produced considerable brain infarction in conjunction with severely impaired motor functions. NBO administration did not produce significant neuroprotective effects compared to control group when combined treatment with enalapril and NBO significantly reduced the infarct volume ($p<0.001$) and improved the motor functions($p<0.001$).

Conclusion: The combination therapy with enalapril and normobaric oxygentherapy can noticeably decrease ischemic brain injury and improve neurological motor functions following ischemic stroke.

Keywords: Stroke, enalapril, normobaric oxygen therapy, rat.