

Evaluation of therapeutic effects of calcitriol during first five days after ischemic stroke in a rat model of transient focal cerebral ischemia

Abstract

Background: Stroke is the third leading cause of death and long-term disability in the world. The pathophysiology of stroke is complex and there is no effective treatment option for it. Previous studies have shown that vitamin D has a short-term protective effect against ischemic stroke. However, further data on this aspect is needed before it can be evaluated as a treatment in patients.

aims: This study was designed to evaluate the therapeutic effects of sequential doses of calcitriol during the first five days after stroke in an experimental rat model.

Materials and methods: 30 male Sprague – Dawley rats were studied in three main groups (n = 10) including Sham group (neck surgery without ischemia), ischemic group receiving vehicle and the ischemic group receiving calcitriol treatment (2 µg / kg for five days following stroke). Focal cerebral ischemia was induced by 60-minute-long occlusion of middle cerebral artery and followed by five days reperfusion. The neurological disorders in the animals were examined using Longa neurological test. The grip strength test was used to determine the severity of muscular weakness, while the hot plate test was performed to evaluate the animals' sensory function. Infarct size was determined by triphenyltetrazolium chloride staining technique and cerebral edema was also assessed using the Wet/Dry method.

Results: This study's findings show that, ischemic stroke and subsequent reperfusion caused considerable sensorimotor deficits, a significant infarct volume, and edema in the left hemisphere in control rats. Calcitriol treatment for 5 days improved sensorimotor impairments, reduced infarct volume, and lowered the severity of cerebral edema as compared to the control group. Furthermore, the calcitriol treatment group had a lower mortality rate than the control group.

Conclusion: Treatment with calcitriol during the first five days following ischemic stroke reduced the infarct size and decreased the severity of the cerebral edema. These protective effects were associated with the improvement of sensorimotor disorders caused by stroke.

Key words: Ischemic stroke, sensorimotor deficits, calcitriol, rat.