Abstract

Introduction: Cerebral ischemia is the third leading cause of death and the primary cause of permanent disability worldwide. Atorvastatin is a promising drug with neuroprotective effects that may be useful for the treatment of stroke. However, the effects of atorvastatin on specific neuronal populations within the nigrostriatal system following cerebral ischemia are unknown. Objective: To evaluate the effects of atorvastatin on dopaminergic and GABAergic neuronal populations in exofocal brain regions in an experimental rat model of transient focal cerebral ischemia. Materials and methods: Twenty-eight male eight-week-old Wistar rats were used in this study. Both sham and ischemic rats were treated with atorvastatin (10 mg/kg) or carboxymethylcellulose (placebo) by gavage at 6, 24, 48 and 72 hours post-reperfusion. We analyzed the immunoreactivity of glutamic acid decarboxylase and tyrosine hydroxylase in the globus pallidus, caudate putamen and substantia nigra. Results: We observed neurological damage and cell loss in the caudate putamen following ischemia. We also found an increase in tyrosine hydroxylase immunoreactivity in the medial globus pallidus and substantia nigra reticulata, as well as a decrease in glutamic acid decarboxylase immunoreactivity in the lateral globus pallidus in ischemic animals treated with a placebo. However, atorvastatin treatment was able to reverse these effects, significantly decreasing tyrosine hydroxylase levels in the medial globus pallidus and substantia nigra reticulata and significantly increasing glutamic acid decarboxylase levels in the lateral globus pallidus. Conclusion: Our data suggest that post-ischemia treatment with atorvastatin can have neuro-protective effects in exofocal regions far from the ischemic core by modulating the GABAergic and dopaminergic neuronal populations in the nigrostriatal system, which could be useful for preventing neurological disorders.

Keywords

GABAergic neurons, dopaminergic neurons, brain ischemia; models, animal; rats.