

Whole body vibration exercise on intrastriatal hemorrhage-induced apoptotic neuronal cell death in the hippocampal CA1 resion of rats

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Intracerebral hemorrhage is one of the most devastating types of stroke. This disease is known to cause severe neurological damage and also has a very high mortality rate. In the present study, the effects of sonic whole body vibration exercise on short-term memory and apoptotic neuronal cell death in the hippocampal CA1 resion following intracerebral hemorrhage in rats were investigated. Intracerebral hemorrhage was induced by injection of collagenase into the hippocampal CA1 resion using a stereotaxic instrument. The rats were divided into 6 groups: the sham-operation group, the hemorrhage-induction group, the hemorrhage-induction and treadmill exercise group, the hemorrhage-induction and 8Hz vibration exercise group, the hemorrhage-induction and 16Hz vibration exercise group, and the hemorrhage-induction and 24Hz vibration exercise group. The animals in the treadmill exercise group were forced to run at a speed of 2 m/min for the first 5 min, 5 m/min for the next 5 min, and then 8 m/min for the last 20 min, with zero degree of inclination. The animals in the vibration exercise groups received whole body vibration for 30 min once a day during 14 consecutive days. In the present results, the apoptotic neuronal cell death in the hippocampal CA1 resion were significantly increased following intrastriatal hemorrhage and that whole body vibration exercise suppressed hemorrhage-induced inhibited apoptotic neuronal cell death in the hippocampal CA1 resion. Whole body vibration exercise improved short-term memory by suppressing the hemorrhage-induced apoptotic neuronal cell death in the hippocampal CA1 resion. In addition, Whole body vibration suppressed the hemorrhage-induced cell proliferation in the hippocampal CA1 resion, that is a compensatory response to hemorrhage-induced excessive neuronal cell death. Here in this study, we have shown that whole body vibration exercise overcomes intracerebral hemorrhage-induced apoptotic neuronal cell death and thus facilitates recovery following intracerebral hemorrhage.

Keywords: Intrastriatal hemorrhage; Hippocampal CA1; Whole body vidration exercise; Neuronal cell death; Apoptosis; Short-term memory