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Dose-Effect Relationship of Hyperbaric Oxygen Therapy in Rats with Amnestic Mild Cognitive Impairment

Subject Area: Geriatrics and Gerontology , Neurology and Neuroscience , Psychiatry and Psychology

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Abstract

Introduction: Amnestic mild cognitive impairment (aMCI) represents an intermediate stage between normal aging and dementia. Hyperbaric oxygen (HBO) therapy has shown promise in enhancing brain oxygenation and promoting neural stem cell proliferation. ***Methods:*** Eighty SD male adult rats were randomly divided into control group, amnestic mild cognitive impairment group (aMCI group), and hyperbaric oxygen group (HBO group). The HBO group was divided into 6 subgroups according to different treatment pressures: 1.6 ATA subgroup, 1.8 ATA subgroup, 2.0 ATA subgroup, 2.2 ATA subgroup, 2.5 ATA subgroup, and 2.8 ATA subgroup, with 10 in each group. The HBO group received HBO therapy at the specified pressure for 60 min per day for 5 consecutive days. ***Results:*** After HBO treatment, compared with the aMCI group, the escape latency of each HBO subgroup was significantly shortened ($p < 0.001$). The 2.0 ATA subgroup ($p = 0.001$), 2.2 ATA subgroup ($p = 0.001$), and 2.5 ATA subgroup ($p = 0.002$) significantly increased the number of platform crossings. The levels of superoxide dismutase were significantly increased in 1.6 ATA subgroup ($p = 0.019$), 1.8 ATA subgroup ($p = 0.003$), 2.0 ATA subgroup ($p = 0.010$), and 2.2 ATA group ($p = 0.016$) and malondialdehyde contents were significantly decreased in the 1.6 ATA subgroup ($p = 0.015$), 1.8 ATA subgroup ($p = 0.012$), 2.0 ATA subgroup ($p = 0.002$), and 2.2 ATA subgroups ($p < 0.001$), and the levels of endothelial nitric oxide were significantly decreased in the 1.8 ATA subgroup ($p = 0.007$) and 2.0 ATA subgroup ($p = 0.029$), and the expression of neuronal nitric oxide were significantly decreased in the 1.8 ATA subgroup ($p = 0.006$), 2.0 ATA subgroup

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($p < 0.001$), and the 2.2 ATA subgroup ($p < 0.001$). ***Conclusion:*** In aMCI model rats, HBO treatment at a pressure of 2.0 ATA with a stabilization time of 60 min per day for 5 days was the most effective.

Journal Section: Research Article

Keywords: Hyperbaric oxygen, Amnestic mild cognitive impairment, Dose-effect relationship, Oxygen toxicity

Supplementary Material for: Dose-effect Relationship of Hyperbaric Oxygen Therapy in Rats with Amnestic Mild Cognitive Impairment

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