

Original Paper

Effect of memantine on spatial learning and memory in electrical lesions model of nucleus basalis magnocellularis: animal model of Alzheimer's disease

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Abstract

Background and Objective: Memantine (MEM) an uncompetitive N-methyl-D-aspartate receptor antagonist is used for treatment of patients with Alzheimer disease. This study aimed to examine the effect of Memantine on the spatial learning and memory in electrical lesion's model of nucleus basalis magnocellularis (NBM) in animal model of Alzheimer's disease.

Methods: In this experimental study, 56 adult male Wistar rats were allocated into eight groups: control group; lesion group, which received bilateral electrically lesion (0.5 mA, 3s) in NBM; sham group (the electrode was entered into the NBM with no lesion); Memantine groups (lesion+1 mg/kg/bw of MEM; lesion+3 mg/kg/bw of MEM; lesion+5 mg/kg/bw of MEM; lesion+7 mg/kg/bw of MEM) and Vehicle group (lesion+0.2 mL saline). After one week, animals were trained to perform the Y-maze task for five days. Twenty five days after training, a retention test was performed to determine long-term memory.

Results: The bilateral lesion of NBM impaired the spatial learning compared to the control and sham groups ($P<0.05$). No effect on spatial learning was seen in saline group compared with the lesion group. The treatment with Memantine in lesion+MEM 3 mg/kg/bw, lesion+MEM 5mg/kg/bw and lesion+MEM 7mg/kg/bw groups significantly improved spatial learning ($P<0.05$). Moreover, no significant difference of memory was observed between the results in the 5th day of training and the retention test of the 30th day.

Conclusion: Treatment with memantine improves spatial learning defects in electrical lesions model of NBM of Alzheimer's disease in dose dependent manner in animal model.

Keywords: Alzheimer disease, Nucleus basalis of magnocellularis, Spatial learning, Memantine

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