

Original Paper

Effect of bone marrow mesenchymal stem cells on memory and neuronal cells number in the trimethyltin chloride damaged hippocampus

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Abstract

Background and Objective: Stem cells are a suitable treatment method for improvement of central nervous system diseases. Neuron regeneration is occurred in damaged region using stem cell transplantation. This study was done to determine the effect of bone marrow mesenchymal stem cells on memory and neuronal cells number in the trimethyltin chloride damaged hippocampus.

Methods: In this experimental study, 28 wistar male rats were allocated into four groups including control, model, Vehicle and treatment groups. Animals were received 8 mg/kg/bw of neurotoxin trimethyltin chloride by the intraperitoneal injection for causing damage in hippocampus. One week after intraperitoneal injection of trimethyltin chloride, stem cells were injected by stereotaxy method. Six weeks after stem cells injection, the spatial memory was assessed by Morris water maze and histological studies were done by Nissl staining and normal cells count by Olysia bio report software.

Results: After bone marrow mesenchymal stem cells graft, the number of normal cells were more in the treatment group (74 ± 15.190) in compared to the Vehicle (44.67 ± 12.971) and Model (48.56 ± 18.105) groups ($P < 0.05$). Also in Morris water maze test, the treatment group (387.35 ± 189.18), (31.30 ± 13.67) spent shorter distance and escape latency to reach the hidden platform, but this reduced non significantly in compared to Vehicle (438.18 ± 192.56), (40.14 ± 14.89) and model (407.98 ± 225.44), (37.68 ± 17.15) groups. The model and Vehicle groups spent longer distance to reach the hidden platform in comparison with the control (275.45 ± 165.10) group ($P < 0.05$). Also the traveled distance in target quarter had significant increased in the treatment groups (799.80 ± 125.91) in compared to model (588.51 ± 136.94) and Vehicle (546.48 ± 86.47) groups ($P < 0.05$).

Conclusion: Using the bone marrow mesenchymal stem cells leads to reduce hippocampal lesions and increase the number of pyramidal neurons and improving memory in damaged hippocampus in animal model.

Keywords: Neurogenesis, Bone marrow mesenchymal stem cells, Hippocampus, Trimethyltin chloride, Spatial memory

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