

Mesenchymal Stem Cells and Boswellia Serrata Extract Ameliorate Histopathological Deficits and Brain Oxidative Stress in the experimental model of Cuprizone-induced demyelination

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Abstract

Background and Aim: Addressing Multiple Sclerosis has posed a considerable challenge for researchers. This study investigated the impact of concurrently administering Boswellia serrata extract and adipose tissue mesenchymal stem cell transplantation in an experimental model of cuprizone-induced Multiple Sclerosis.

Methods: Forty-two C57BL/6 mice were randomly allocated into six groups: 1. control (CO), 2. Cuprizone-induced multiple sclerosis model (CPZ), 3. CPZ+DMEM (culture medium), 4. CPZ+SC (Stem Cells), 5. CPZ+BOS (Boswellia extract), and 6. CPZ+SC+BOS. Animals in groups 2 to 6 underwent demyelination through oral administration of 0.3% doses of cuprizone for six weeks. Intraperitoneal injections included 1 million stem cells, and Boswellia extract at 100 mg/kg. Behavioral, histopathological, immunohistochemical, and oxidative stress evaluations were performed.

Results: Boswellia extract and stem cells increased animal resistance in the rotarod test, prevented weight loss, and reduced the demyelination rate in the corpus callosum. Additionally, they elevated the number of oligodendrocytes, astrocytes, myelin basic protein expression, and total antioxidant capacity levels while reducing malondialdehyde levels. The combined administration of Boswellia extract and stem cells exhibited more pronounced effects than individual treatments.

Conclusions: The Co-administration of Boswellia extract and adipose tissue mesenchymal stem cells emerges as a potentially novel and effective therapeutic approach for the functional and structural preservation of the nervous system in Multiple Sclerosis.

Keywords: Boswellia serrata extract; Mesenchymal stem cell; Multiple sclerosis; Demyelination