Histological and Immunohistochemical Study on the Possible Therapeutic Effect of Bone Marrow-Derived Mesenchymal Stem Cells on Experimentally-Induced Ovarian Failure in Rats

Dina Helmy Mohammed [1], Noha Abdel Latif Ibrahim[2]

1. Histology Department, Faculty of Medicine, Cairo University, Egypt
2. Histology Department, Faculty of Medicine, Fayoum University, Egypt

Abstract

Background: Premature ovarian failure (POF) was a heterogeneous syndrome characterized by lack of folliculogenesis. Cyclophosphamide (CP), one of the widely used anticancer drugs, has adverse effects on ovarian function. Mesenchymal stem cells (MSCs) represent a promising tool for new clinical concepts in supporting cellular therapy.

Aim: To explore the possible therapeutic potency of bone marrow-derived MSCs transplantation on ovarian folliculogenesis using a rat model of cyclophosphamide (CP) - induced premature ovarian failure.

Materials and methods: Twenty-five mature female rats were divided into three groups: 1.**control group** (four rats). 2.**CP only group** (ten rats) injected with CP intraperitoneally for 14 days, then subdivided equally into subgroup IIa sacrificed immediately and subgroup IIb sacrificed 8 weeks after end of CP injection. 3. **CP+MSCs group** (ten rats) injected IP with CP for 14 days, then received single MSCs IV injection and sacrificed after 4 weeks (subgroup IIIa) and 8 weeks (subgroup IIIb). Histological (using H&E and Masson's trichrome stains) and immunohistochemical (using Bcl2 and Bax) studies were performed. This was followed by morphometric measurements and statistical analysis.

Results: CP caused massive primordial follicle loss with stromal blood vessel damage. Also significantly increased fibrosis and Bax immunoexpression and decreased Bcl2 immunoreactivity were found. These findings were not improved after cessation of CP for 8 weeks. Meanwhile, MSCs therapy restored ovarian folliculogenesis and reduced these histological and immunohistochemical changes.

Conclusions: There was a significant role of MSCs treatment in restoration of ovarian folliculogenesis after CP-induced ovarian failure.

Keywords: POF, Cyclophosphamide, MSCs, Bax, Bcl2, immunohistochemistry.

Corresponding author: Dina Helmy. Tel.: 01118077724

Email: dinahelmy2000@yahoo.com