عنوان مقاله:

Microvesicles Derived from Human Placental Mesenchymal Stem Cells Induce Autophagy and Apoptosis in Acute Myeloid Leukemia

محل انتشار:

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خلاصه مقاله:

Background and Objective: Acute myeloid leukemia (AML) has a complex course of treatment, including chemotherapy and bone marrow transplantation, which mostly results in drug resistance and recurrence. Therefore, alternative therapies have attracted the attention of researchers. Mesenchymal stem cells exert their paracrine effects through the secretion of multiple cytokines and vesicles. Recent findings suggest the possible antitumor properties of MSCs by the secretion of micro-vesicles, and consequent activation of cell death pathways in cancer cells. The present study evaluated how micro-vesicles from human placental mesenchymal stem cells affect the autophagy and apoptosis pathways in AML. Materials and Methods: After isolation and culture, hPMSCs were identified through flow cytometry. The Bradford method was employed to determine the concentration of MVs. The properties of MVs were confirmed by transmission electron microscopy (TEM) and DLS. Next, the KG۱ cell line was exposed to MVs at concentrations of ۲۵, ۵۰, and ۱۰۰ µg/ml for ۲۴ hours. Subsequently, apoptosis was assessed using an Annexin V-FITC/PI kit, and ROS activity was gauged through the utilization of H۲DCFDA. The gene expression in the autophagy and apoptosis pathways was investigated by using the real-time PCR technique. Results: After ۲۴ hours of treatment, a rise in intracellular ROS accumulation and apoptosis was observed in all groups compared to the control group. The mean intracellular ROS accumulation at the concentrations of ۲۵, ۵۰, and ۱۰۰ µg / ml of the samples and the control group was ۶۲.۲۱% (P<۰.۰۰۰۲), ۶۶.۲۵% (P<۰.۰۰۰۱), ۶۲.۵۵% (P<۰.۰۰۰۱), and ۲۶.۱% (P<۰.۰۰۰۱), respectively. The apoptosis indices at the concentrations of ۲۵, ۵۰, and ۱۰۰ µg / ml of the samples were ۶۲.۶% (P<۰.۰۰۰۲), ۴۶.۰% (P<۰.۰۰۰۱), and ۴۸.۲% (P<۰.۰۰۰۱), respectively. Furthermore, analyzing genes through RT-PCR indicated a considerable increase in the expression of autophagy-related and pro-apoptotic genes. Conclusion: Our findings indicate that hPMSC-MVs induce Cell death pathways of autophagy and apoptosis in the KG۱ cell lines. Additionally, hPMSC-MVs exhibited heightened impactful anti-proliferative and pro-apoptotic outcomes on KG۱ cells in vitro.

کلمات کلیدی:

Placental Mesenchymal Stem Cell, Micro-vesicles, Acute Myeloid Leukemia, Autophagy, Apoptosis