

Impact of caffeic acid on histopathological alterations and oxidative stress factors in the ovaries of mice in a model of premature ovarian insufficiency

Abstract

Background: Premature ovarian insufficiency (POI) is a heterogeneous condition, which is described as the cessation of ovarian function, women below 40 years. One of the important factors in this disease is oxidative stress, which facilitates the process of premature ovarian failure through various mechanisms.

Aim: The aim of this study is to investigate the effect of caffeic acid on histopathological changes and oxidative stress factors and gene expression changes in the ovaries of POI model mice.

Materials and Methods: 32 female mice were randomly divided into 4 groups (n=8): control; 2) POI; 3) POI+CAF and 4) caffeic acid. POI was induced through daily injection of D-Galactose (200mg/kg, intraperitoneal) for 6 weeks. Caffeic acid (60 mg/kg, intraperitoneal) was injected daily for 4 weeks from day 15. One day after the last injection mice were anesthetized and the ovaries were removed after blood sampling. Then the level of FSH and LH hormones, oxidative stress factors and histopathological changes were evaluated. One of the ovaries was used to examine the expression of Nrf2, SOD, Gpx and oxidative stress factors, and the other was used to examine histopathological changes.

Results: The results showed that digalactose-induced POI significantly increased FSH, LH and MDA levels ($p<0.05$) and decreased SOD, GPx and TAC levels in contrast to control group ($p<0.05$). In POI group, the expression of Nrf2, SOD and Gpx genes was significantly decreased compared to the control group ($p<0.05$). Also, in this group, the number and diameter of follicles decreased significantly compared to the control group ($p<0.05$). Administration of caffeic acid in the POI+CAF group significantly improved the above parameters ($p<0.05$).

Conclusions: The results indicated that Caffeic acid reduces the adverse effects of POI on ovaries in mice by reducing oxidative stress and increasing antioxidant defenses.

Keywords: Caffeic acid, Premature ovarian insufficiency, Ovary, Oxidative stress, mice.