

Determination of the effect of caffeic acid on spermatogenesis of male mice treated with cisplatin

Abstract

Background: Today, infertility is one of the major problems of human societies. One of the factors of infertility in men is oligospermia. One of the main causes of oligospermia is oxidative stress and it is considered as one of the most basic therapeutic strategies.

Aim: To investigate the effect of caffeic acid on spermatogenesis of male mice treated with cisplatin

Materials and methods: In this study, 24 adult male mice with an approximate weight of 25-30 grams and an approximate age of 2 months were used. The studied mice were divided into four groups of 6 including: 1) control group (received normal saline) 2) cisplatin group (received normal saline + cisplatin at a dose of 2.5 mg/kg for 5 consecutive days on the 7th and 14th day) 3) group Cisplatin + caffeic acid (received caffeic acid 60 mg/kg + cisplatin at a dose of 2.5 mg/kg for 5 consecutive days on the 7th and 14th day) 4) caffeic acid group (received caffeic acid 60 mg/kg). After 35 days and after an overnight 10-12 hour fast, the studied groups were anesthetized using intraperitoneal injection of ketamine-xylazine and testicular tissue along with epididymis was isolated. Hematoxylin-eosin staining used for diagnostic histopathological changes. Real-time PCR method was used to evaluate gene expressions. The tissue levels of MDA were evaluated by colorimetric method.

Results: The expression level of SOD and Nrf2 genes increased in all studied groups compared to the control ($p < 0.05$). GPX gene expression increased in the studied groups except for the cisplatin group compared to the control ($p < 0.05$). The gene expression of SOD, GPX and Nrf2 increased in the groups receiving caffeic acid and caffeic acid treated with cisplatin compared to the cisplatin group ($p < 0.05$). Tissue damage index and the height of germ cell epithelium in the group receiving caffeic acid decreased compared to the control group, and

the Johnson score index increased in the groups receiving caffeic acid and caffeic acid treated with cisplatin ($p < 0.05$). The outer diameter of the germ cells decreased in the cisplatin group, but this decrease was not significant ($p > 0.05$). Tissue levels of MDA significantly decreased in the groups treated with cisplatin compared to the control group ($p < 0.05$).

Conclusion: Based on our results, it was shown that caffeic acid with a dose of 60 mg/kg improved sperm evaluation indicators such as number, motility, viability, morphology, and minimized damage to the sperms and germ cells. In addition, caffeic acid increased the expression of SOD and GPX genes in testicular tissue, as well as, the Nrf2 expression.

Key words: spermatogenesis, infertility, caffeic acid, mice