

The Protective Effects of genistein on Nicotine-induced Changes in Rats Ovarian Follicles

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Abstract

Background: Nicotine exposure causes impaired fertility and ovarian dysfunction. The aim of this study was to investigate the possible protective role of genistein, which is known as an antioxidant agent on altered ovarian functions upon nicotine exposure.

Methods: A total of 40 female adult vistar rats were divided randomly into four groups (n=10). The control group received vehicle, while group 2 received nicotine (40 µg/kg) for 15 days and group 3 genistein (5 mg/kg) for 5 days. Group 4 received both nicotine (40 µg/kg) and genistein (5 mg/kg) for the same periods. All animals were treated intraperitoneal. After autopsy on the 16th day, histopathological and morphometric examinations were performed and serum estradiol concentrations were measured. The data were analyzed using ANOVA and Tukey post hoc test. A value of $p < 0.05$ was considered significant.

Results: Nicotine significantly reduced the number of pre-antral and antral follicles, as well as estradiol concentration compared to the control group ($p < 0.05$). However, the decrease in the number of primordial follicles was not significant in the nicotine treated group. A significant increase in the follicles atresia were observed in group 2 compared to the control group ($p < 0.05$). Moreover, genistein caused a marked normalization in the number of ovarian follicles and estradiol levels in group 4 compared to group 2.

Conclusion: The results from this study suggest that genistein may have a protective effect against nicotine-induced ovarian changes on the number of different stages of follicle growth.

Keywords: Genistein, Nicotine, Ovarian follicle, Rats.

Introduction

cigarette smoke contains a mixture of 4000 toxic chemicals, including nicotine, addictive components, Carbone monoxide, and several recognized carcinogens and mutagens [1]. Smoking has deleterious effects on cardiovascular, pulmonary physiology and reproductive system [1]. In women, smoking is associated with infertility, spontaneous abortion, menstrual abnormalities, ectopic pregnancies and early onset of menopause [2, 3].

Nicotine is a highly toxic substance and it is quickly absorbed through the respiratory tract, mouth mucosa and skin [1]. Nicotine is extensively metabolized to a number of metabolites by the liver.

Quantitatively, the most important metabolite of nicotine in mammalian species and humans is the lactam derivative cotinine. In humans, about 70 to 80% of nicotine is converted to cotinine [4]. In adult humans, cotinine has been detected in the follicular fluid of women who smoke, demonstrating that nicotine reaches the ovary and developing follicles.