Abstract:

Effect of hydroalcoholic extract of fennel seed (Foeniculum vulgare) on learning and memory, anxiety-like behavior and BDNF gene expression in the hippocampal formation of ovariectomized rats

Background: About 50% of the human population is women. Menopause is a period of a woman's life in which the plasma estrogen level decreases. During this period, women are susceptible to osteoporosis and memory loss, and forgetfulness, so they become sensitive to hot flashes. Using chemical drugs has side effects. Many native medicinal plants of Iran have medicinal properties. In folk medicine, Fennel (Foeniculum vulgare, FV) has been used as an estrogenic agent for thousands of years.

Aim: Due to the importance of menopause and its effects on the life of postmenopausal women, as well as the profound and proven effects of sex hormones such as estrogen, the present study was designed to investigate the effect of hydroalcoholic extract of fennel seeds (FV) on learning, memory, anxiety-like behavior and BDNF gene expression in the hippocampus of ovariectomized rats.

Materials and Methods: Forty-eight adult female Sprague-Dawley rats (3 months) kept in special cages at ambient temperatures of 22 to 25 ° C and a 12-hour light cycle, free accessing to sufficient amount of food and water. The weight of selected rats was approximately 220-180 g, randomly divided into 6 groups of 8. The healthy control group did not receive any medication, the control group underwent ovariectomy, the sham group received dimethyl sulfoxide (DMSO,5%, IP), and the surgical sham group (without ovarian resection) was administered to 17B estradiol (10 µg / kg). Intraperitoneally - two months), fennel seed hydroalcoholic extract group (at a dose of 200 mg/kg - intraperitoneally - two months). After two months of treatment, learning, and memory behavioral tests including Open Field and Shuttle Box. The rats anesthetized and their hippocampus was removed for BDNF gene expression.

Results: Injection of fennel extract and estradiol into female rats during two months reduced stress in rats compared to other groups. Also, the increase in learning memory in the two groups of fennel and estradiol (especially the fennel group) was significantly higher than the

control group. This extract increased the expression of the BDNF gene in the fennel hippocampus compared to other groups.

Conclusion: The findings of this study showed that the hydroalcoholic extract of FV is effective in reducing stress and increasing the gene expression of BDNF. Proteins related to synaptic formation in the hippocampus improves spatial learning and memory function in ovariectomized rats. This indicates the positive effects of fennel seeds on memory and learning.

Keywords: Fennel, Ovariectomy, Learning, memory, Anxiety- like behavior, Hippocampus, BDNF,Female rat