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The Effect of Celery (*Apium graveolens*) Extract on the Reproductive Hormones in Male Mice

Mehrdad Modaresi^{a,*}, Gholamreza Ghalamkari^a and Alireza jalalizand^b

^a Department of Animal Science, Khorasgan (Isfahan) Branch, Islamic Azad University, Isfahan, IRAN

^b Department of Plant protection, Khorasgan (Isfahan) Branch, Islamic Azad University, Isfahan, IRAN

Abstract

Celery (*Apium graveolens*) has many therapeutic effects. This plant has many phytoestrogens that can affect on the reproductive endocrine system and can reduce fertility. In this study, Hydro alcoholic extracts of celery leaves on the pituitary -gonad axis in young male 1 mice of Balb/C was investigated. The samples were randomly divided into 5 groups (three treatment groups, placebo and control). Celery leaves hydroalcoholic extract in different doses (50, 100,150 mg/kg/2day) was injected (IP) for 20 days. The Placebo group was used for injection of normal saline. The samples were randomly divided into 5 groups (three treatment groups, placebo and control). Celery leaves hydroalcoholic extract in different doses (50, 100,150 mg/kg/2day) was injected (IP) for 20 days. The Placebo group was used for injection of normal saline. After 10 injections, samples bloods were analyzed for FSH, LH, and testosterone using RIA method and compared with control groups and compared with control groups. Concentrations of FSH in 100 and 150 mg/kg decreased significantly while LH and testosterone concentrations in all experimental groups decreased ($P<0.05$). This study showed dose-dependent negative effect of celery extracts in the pituitary - gonad axis in male mice.

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1. Introduction:

Medicinal plants, dating back several thousand years in the treatment of diseases and their therapeutic

* Corresponding author: Mehrdad Modaresi Tel.: +98-913-2074854 ; fax: +98-311-5354060.
E-mail address: mehrdad_modaresi@hotmail.com.

effects has been proved (Modaresi , 2012) and expensive chemical drugs cause side effects and herbal medicine is people's attitudes. But along with increased consumption, due to false beliefs and attitudes that herbal medicines are completely safe, adverse side effects, especially in cases of uncontrolled consumption to come from consumers (Elisabetkeye, 1990). Celery contains vitamin C and other materials that are health enhancing substances such as Phalides, which lowers cholesterol and Coumarrins that helps prevent cancer. Celery seeds of anti-rheumatism, sedative, antiseptic urinary tract, increased excretion of uric acid, blood pressure lowering, to some extent against fungal diseases, diuretic, analgesic, anti-inflammatory, detoxification, anti-spasmodic, anti-bacteria, binding rules, anti-contractions, seizures, stomach tonic and is carminative (Blumental , 2000). In recent years numerous studies have shown that the percentage prevalence of infertility and reproductive system abnormalities in all the world is increasing. Infertility can be one of the natural plant compounds (phytoestrogens) that are widely used in life, which can affect the reproductive endocrine system and can reduce fertility. According to available reports contain phytoestrogens might celery plants and in this respect can be effective in reproductive physiology (Modaresi , 2012). The high rate of consumption of herbal medicines and are available in the market. The important point in relation to the dose of herbal medicines . The aim of this research was determine the effect of three doses of herbal extracts in the celery on the pituitary - gonad in Balb/C mice.

2. Materials and Methods:

This experimental study conducted in 2010-2011 at Islamic Azad University , Khorasgan Branch (Isfahan). 50 mice (*Balb/c*) were prepared from animal division of Isfahan University in range of 25-40 g. Samples were divided to five groups (with 10 rats in each group) including one control group, three treatment groups and placebo group, and were kept in separate cages. All samples were kept in natural light , water, and food at 25-30°C for two weeks to environment adaption. This situation was continued in injection period too.

Experimental groups were selected as follows:

- Control group: In order to basal hormones LH, FSH and testosterone in the group treated groups in the same conditions but without injecting the test period was recorded.
- Placebo Group: to ensure the injection of the test result and its comparison with the control group, this group daily rate 0.5 ml normal saline was injected.
- Treatment group 1 consisted of ten mice that daily received 50 mg/kg/2day celery hydro alcoholic extract.
- Treatment group 2 consisted of ten mice that daily received 100 mg/kg/2day celery hydro alcoholic extract.
- Treatment group 3 consisted of ten mice that daily received 150 mg/kg/2day celery hydro alcoholic extract.

The injections were performed on alternate days and 6 pm. One day after last injection, blood samples of heart were prepared to study variation of sexual hormones.

3. Statistical analysis

Obtained data were analyzed using one way variance analysis of *SPSS 11.5* program, and mean comparison was done using Duncan test.

4. Results

4.1. Evaluation of FSH

The mean level of FSH in the blood serum of experimental groups and control in comparison level ($P < 0.05$) was determined using Duncan test between two experimental groups 2 (100 mg / kg) and 3 (150 mg / kg)

decreased significantly (Figure 1)

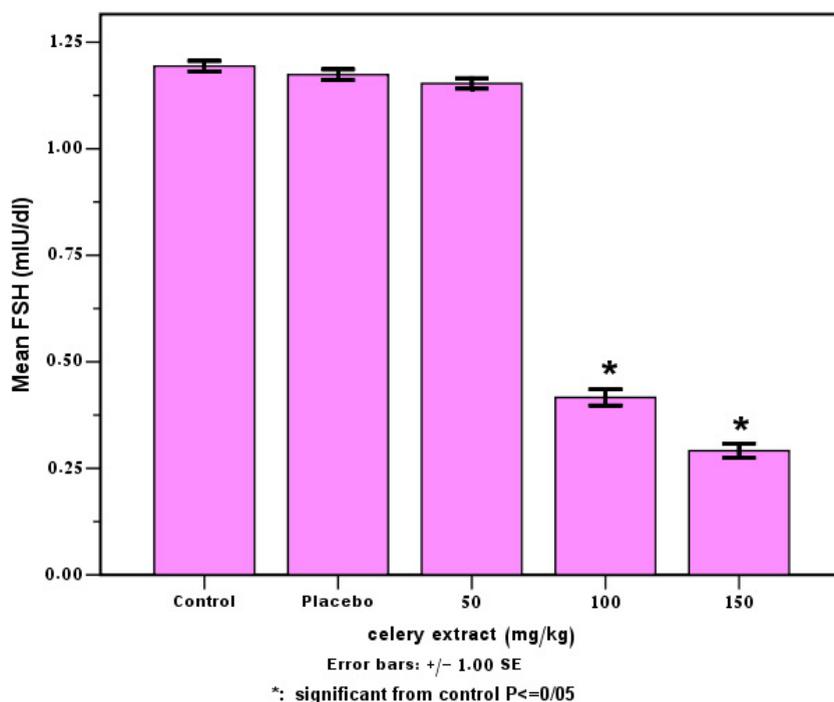


Fig. 1. The Concentration of FSH in various groups

4.2. Evaluation of LH

The mean level of LH in the blood serum of experimental groups and control in comparison level ($P < 0.05$) was determined using Duncan test between three experimental groups1 (50 mg / kg) ,groups2 (100 mg / kg) and 3 (150 mg / kg) decreased significantly. Figure 2 shows this difference.

4.3. Evaluation of testosterone

The mean level of testosterone in the blood serum of experimental groups and control in comparison level ($P < 0.05$) was determined using Duncan test between three experimental groups1 (50 mg / kg),groups2 (100 mg / kg) and 3 (150 mg / kg) decreased significantly. Figure 2 shows this difference. (Fig: 3).

5. Conclusion

In this research extract celery on the pituitary-gonad in male mice was investigated. Concentration of LH, FSH and testosterone hormone were examined and compared with a control group .

- - Changes in the levels of FSH and LH. The results showed in this study, celery extracts, caused significant reduction in mean of LH, FSH , which seems to inducted an inhibitory effect on the pituitary – gonadal in mice .
- - The main pathway of sexual control is the hypothalamic - pituitary - gonadal (HPG). The center, under

the direct influence of feedback control, the regulation of sexual activity in humans and other mammals are. The axis of the male hormone testosterone and spermatogenesis for very precise control of such acts:

- - Hypothalamic releasing hormones, stimulating the secretion of pituitary and gonadal hormone (LH, FSH) from which these cells.
- - The hormone LH, go with the Leydig cells of the testes to secrete androgens (testosterone) increase. FSH is the hormone that stimulates spermatogenesis.
- - With the rising levels of androgen hormones to regulate and control the axis hormone secretion through its negative effect. Increase in LH and testosterone effects on the hypothalamus and inhibits FSH partly through self-regulation mechanism is negative. Low testosterone also removed the inhibitory effect of testosterone on the hypothalamus.

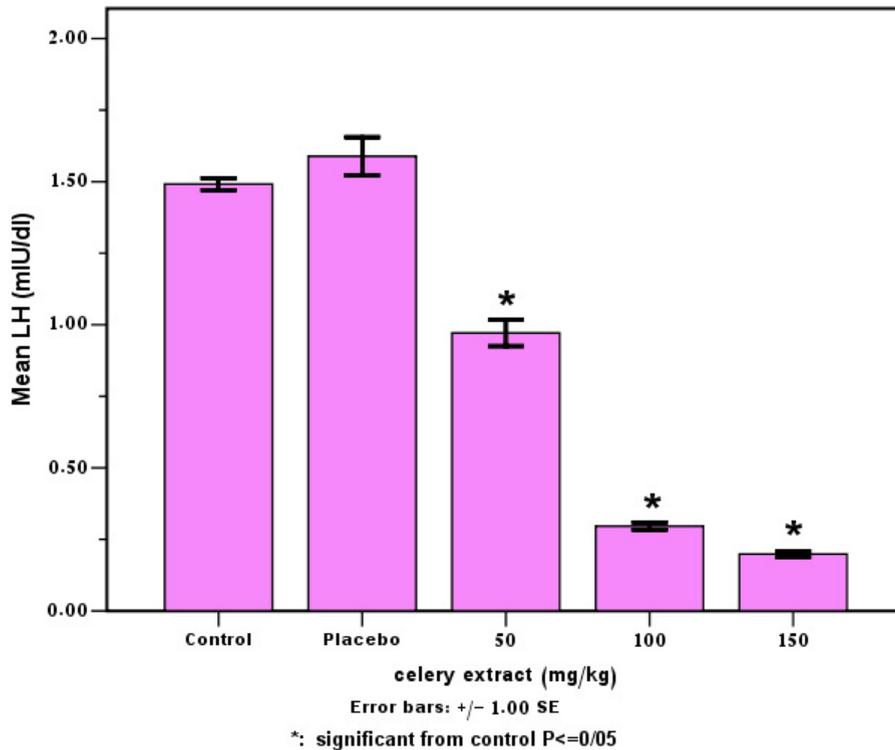


Fig. 2. The Concentration of LH in various groups

Inhibin is an endocrine hormone that is secreted by sertoli cells in testis. This hormone is secreted in response to FSH levels and a negative feedback effect on its secretion and inhibit pituitary FSH and spermatogenesis is regulated. Thus the axis as the main pathway in the regulation of sexual acts [Gayton, 2008]. Axis hypothalamus - pituitary - gonadal can be influenced by various factors, and regulate and balance is impaired. One of these factors are phytoestrogens. Studies have shown that phytoestrogens and structurally similar compounds can act through an anti-estrogen, male reproductive health and the damage to endangered. Some studies have suggested that central nervous system - gonadal and sexual behavior in rats during development is sensitive to phytoestrogens [Santti.1998, Ogawa.2002]. Celery has plenty of vitamin C and has oestrogenic effects (Heydari, 2004). Some research suggests that anti-androgenic properties of celery extracts.

Decrease in FSH and LH levels can be raised following possibilities:

Estrogen-like compounds such as flavonoids in this plant can be increased estrogen levels [Bonani, 1999]. However, excessive secretion of pituitary FSH producing estrogen reduces [Gayton, 2008].

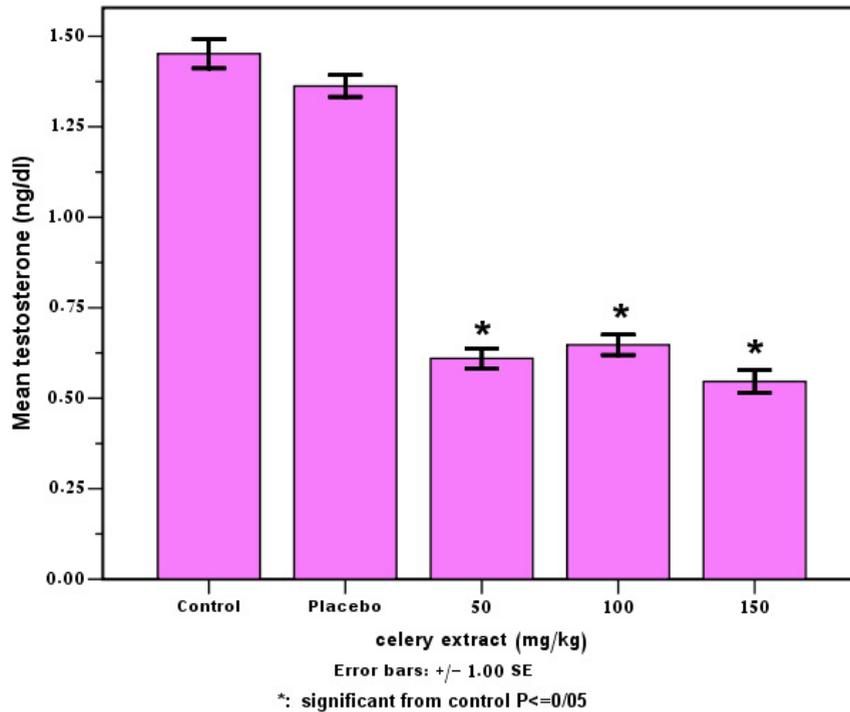


Fig. 3. The Concentration of Testosterone in various groups

Celery compounds can cause toxic effects, can create barriers in FSH and LH synthesis and thus reduce its rates.

Assessment of changes in testosterone levels:

The results showed in this study, Celery extracts, caused significant reduction in mean serum levels of testosterone have been (Figure 3). Decrease in testosterone levels compared to control group raised the following reasons :

- Due to decreased synthesis of LH hormone testosterone decreases.
- Due to reduced number of Leydig cells, also decreases the amount of testosterone synthesis.
- It can be reduced due to the influence testosterone synthesis directly on the celery extracts or its metabolism is increased.

Three enzyme, 17-Hydroxy steroid dehydrogenase , 3Hydroxy steroid dehydrogenase and 17-20-Lyase , making testosterone and aromatase is involved in its metabolism. Aromatase that converts testosterone to estradiol and thus may reduce testosterone levels [Sato.2005, Armanini.2003]. According to the results, it seems that the endocrine function of the plant through celery on pituitary - gonadal can cause negative effects on male reproductive potential is changed. Injection of celery extract in a dose 50 mg / kg decrease in serum LH and testosterone. While celery extract injection in two doses 100 and 150 mg / kg decreased FSH, LH and testosterone were found in serum. This reduction in turn reduces the number of primary spermatocytes and relative weight will be testicular.

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