



Effect of Damask Rose Extract on FSH, LH and Testosterone Hormones in Rats

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ABSTRACT

Damask rose is an herbal medicine that increases libido as recommended in traditional medicine. The present study aimed to evaluate the effect of damask rose extract on serum levels of sex hormones in male rats. In this experimental study, 24 adult male rats were used. The rats were randomly divided into three groups. The first group (control) adequately consumed compressed food and water without any restrictions during the experiment. The second and the third experimental groups respectively consumed 200mg and 400mg damask rose extract per kilogram body weight in a daily manner. Blood samples were taken from all groups after three weeks through anesthesia. The serum was isolated. Serum concentrations of FSH, LH and testosterone were measured. The collected data was analyzed using SPSS, ANOVA and LSD test. Serum levels of FSH, LH and testosterone significantly increased in the experimental groups receiving 200mg and 400mg damask rose extract per kilogram body weight compared to the control group ($P < 0.05$). Damask rose extract stimulates hypothalamic-pituitary-gonadal axis hormones in male rats.

Keywords: damask rose, testosterone, FSH, LH, rat

INTRODUCTION

Nowadays, herbal medicines are widely used due to various reasons such as appropriate and sustainable effectiveness, low side effects, low cost, easy access, etc. In addition, herbal medicines unlike chemical drugs contain many substances that are compatible with human nature. These substances protect heart and liver and neutralize free radicals and toxins [1]. This also applies in the case of reproductive medicines. Damask rose is one herbal medicine that increases libido as recommended in traditional medicine [2].

Damask Rose with the scientific name of *Rosa damascene* Mill belongs to Rosaceace family. This shrub has long been cultivated in Iran. The plant has cylindrical flowering prickly branches without any grooves. This species has comb-like compound leaves with three to five serrated reciprocal leaflets. Damask rose naturally grows in foothills as well as arid and semi-arid climates in Iran. This plant is currently cultivated in 14 provinces in Iran like Fars, Kerman and Kashan [2 and 3].

Water, oil, jam, oil, perfume, soap, etc. can be cited as products of this plant [4 and 5]. In addition, damask rose has many medicinal and therapeutic properties. The Wise Hippocrates has prescribed this plant for abdominal pain, intestinal pain, earache and wound healing. Rosewater production goes back to thousands of years ago, which was

primarily introduced by Sheikh Abu Ali Sina who believed that rosewater is an astringent. The syrup was prescribed for liver failure and bile duct disease. Rose damask flower contains such compounds as anthocyanin, cyanidin 3, 5 diglycoside, vitamin C, carboxylic acid, kaempferol, quercetin, galactoside, arabinoside, naphazoline, citronellol, linalool, geraniol and terpenes [6, 7 and 8].

Numerous studies have shown that damask rose relieves depression and triggers joy and happiness by stimulating central nervous system [9]. Alloys of this plant are hypnotic. Rose damask is also characterized as an antimicrobial [10], anti-virus [11], anti-inflammatory [12], antioxidant [13] and anti-diabetic [14] agent.

Several studies have investigated refreshing, antidepressant and anti-stress effects of damask rose, which also effectively relieves sexual dysfunction [2 and 12]. The study aimed to evaluate probable effect of damask rose extract on sex hormones in male rats.

MATERIALS AND METHODS

The study was registered in Ethics Committee of Jahrom University of Medical Sciences as Jums.REC.1393.062. All ethical issues related to maintenance and use of laboratory animals were observed. In addition, 24 healthy adult male rats were used in this study. The rats were two to three months old. The rats weighted within a range from 180g to 200g. The rats were kept under 12 hours of light and 12 hours of darkness during the experiment. Compressed food and water were available to the rats without any restrictions in period of the study. The rats were kept in animal nurturing room in Jahrom University of Medical Sciences for a week to adapt with the environment. Then, the rats were randomly divided into three groups (one control and two experimental groups), each group consisted of eight rats. The experimental groups received different doses of damask rose extract.

Following procedures were carried out to prepare damask rose extract. First, 100g petals were cleaned, dried and powdered in vitro conditions. The resulting powder was mixed with 70% ethanol at 1:5 ratio (5 times the plant volume). The mixture was thoroughly stirred in a Rothodoxy device for 24 hours at room temperature to obtain a uniform solution. Then, the solution was filtered and dried for 48 hours at room temperature to obtain a solid extract with no alcohol. Then, 200mg and 400mg of the solid extract was dissolved in 1ml of distilled water twice. The solution was refrigerated to be used in next stages [12].

The first group (control) adequately consumed compressed food and water without any restrictions during the experiment. The second and third experimental groups respectively and orally received 200mg and 400mg of ethanol damask rose extract per kilogram body weight in a daily manner for three weeks. At the end of the experiment, blood samples were directly taken from animal hearts using 5ml syringes (under anesthesia by ether). The serum was collected by centrifugation (3000 rpm for 15 minutes) and kept at (-20)°C in the freezer. Serum levels of FSH, LH and testosterone were measured using ELISA kits specific to rats.

Statistical Analysis

ANOVA was used for statistical analysis. Data distribution was normal according to Kolmogrov-Smirnov test. Therefore, parametric tests were used. LSD test was used for mean comparison in some cases where the difference between groups was statistically significant. Statistical analysis was performed using SPSS version 16. Significance level was considered as ($P < 0.05$). The data was calculated and compared as Mean \pm SEM in the result section.

RESULTS

The results showed that mean serum concentration of testosterone in the second experimental group (1.9 ± 0.48) and the third experimental group (2.9 ± 0.49) significantly increased compared with the control group (1.08 ± 0.41) ($P < 0.05$). Mean serum concentration of FSH in the second experimental group (2.7 ± 0.33) and the third experimental group (2.9 ± 0.5) significantly increased compared with the control group (1.95 ± 0.62) ($P < 0.05$). Mean concentration of LH in the second experimental group (1.57 ± 0.4) and the third experimental group (2.0 ± 0.33) significantly increased compared with the control group (1.06 ± 0.31) ($P < 0.05$).

Table 1: Mean serum concentrations of testosterone, FSH and LH in different experimental groups

Variable Groups	Testosterone (ng)	FSH (ng)	LH (ng)
	Mean \pm SD		
Group 1 (control)	1.08 \pm 0.41	1.95 \pm 0.62	1.06 \pm 0.31
The second experimental group (200mg/kg damask rose extract)	1.9 \pm 0.48 *	2.7 \pm 0.33 *	1.57 \pm 0.4 *
The third experimental group (400mg/kg damask rose extract)	2.9 \pm 0.49 *	2.9 \pm 0.5 *	2.0 \pm 0.33 *

Mean are presented as Mean \pm SEM

$P < 0.05$ was considered statistically significant

Asterisk indicates 5% significance level

DISCUSSION

The results showed that 400mg damask rose extract per kilogram body weight increased FSH levels and 200mg and 400mg damask rose extract per kilogram body weight increased levels of LH and testosterone. The simultaneous increase in FSH, LH and testosterone suggest the effects of damask rose extract on hypothalamic-pituitary-testicular axis.

Farnia *et al.* showed that rose damask can improve sexual behavior disorder in patients with depression that use serotonin reuptake inhibitors [SSRI] [15]. Furthermore, other studies have shown identical antidepressant properties of damask rose and amphetamines antidepressant, which acts as norepinephrine by changing release of presynaptic amines [16 and 17]. Increase in gonadotropins [secreted by the anterior pituitary gland] may be due to release of norepinephrine by damask rose extract. Norepinephrine increases synthesis of nitric oxide, which increases release of GnRH from hypothalamus as well as FSH and LH gonadotropins from the anterior pituitary gland [18 and 19].

Testosterone is an androgen hormone secreted by Leydig cells of testes in response to LH stimulation secreted by pituitary gland [20]. Thus, damask rose extract may have affected luteal phase cells in anterior pituitary extract, which would increase LH and consequently increase testosterone.

Increase in testosterone may be due to direct effects of the compounds contained in rose damask extract on synthesis and metabolism of the hormone. Rose is rich in flavonoids and polyphenolics, especially quercetin and kaempferol [6, 7 and 8]. Zohre *et al.* studied the effect of quercetin on hypothalamic-pituitary-testicular axis in 2015. They showed that flavonoids increase testosterone levels, although not affecting LH and FSH [21]. Incremental effect of quercetin on testosterone was also confirmed by Ma *et al.* in 2004 [22]. Flavonoids inhibit 5-alpha reductase enzyme, which converts testosterone to dihydrotestosterone and increase testosterone levels [23]. Flavonoids also competitively bind to an enzyme called aromatase, decrease enzymatic expression, inhibit conversion of testosterone to estrogen and consequently increase testosterone levels [24].

Several studies have indicated strong antioxidant activity of damask rose extract. Such compounds as vitamin C, carboxylic acid, tannin and flavonoid in this plant effectively interact with free radicals [8, 12 and 13]. It is well-known that antioxidant compounds strengthen reproductive system and increase fertility in males. In male reproductive system, antioxidants reduce oxidative stress in testes, increase activity of Leydig cells and consequently increase testosterone secretion and improve spermatogenesis [25 and 26]. Kose *et al.* [2012] showed that rose damask extract can improve the histopathological damage caused by formaldehyde in testes of rats and increase secretion of testosterone [27].

CONCLUSION

The compounds contained in extracts of damask rose effectively increase activity of male reproductive tract probably through increased secretion of FSH from the anterior pituitary and direct effect on metabolism and synthesis of testosterone.

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