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Research Article

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The effects of hydro alcoholic extract of *Boswellia carteri* on reproductive hormones in male mice

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ABSTRACT

Frankincense resin is used for treating many diseases in traditional medicine. This resin is prepared from Boswellia carteri plant. The goal of this study was evaluating the effects of hydroalcoholic extract of Frankincense on pituitary- gonadal axis of mice. Mice were divided into five groups including control, placebo, and three experimental groups with 10 members in each group. Control group did not receive any drug and experimental groups received intraperitoneal injections of 50, 100, and 200 mg/mg of the extract for 20 days every other day. Blood samples were taken at the end of injection period. FSH, LH, estrogen and progesterone hormones were measured. Obtained results were analyzed using SPSS program in a one way analysis of variance and means were compared using Duncan test at 5% probability level. According to results, Frankincense decreased the testosterone hormone in 200 mg/kg dose. FSH amount was increased in 100 and 200 mg/kg groups. Considering the results, frankincense extract can reduce reproductive potential by reducing sexual hormones in male mice dose dependently.

Keywords: Frankincense's extract, sexual hormones, male mice

INTRODUCTION

Frankincense is a strong disinfectant and fragrant which is used frequently together with wild rue. This resin is used for treating many diseases including pain, swelling, bone damage, neurological and rheumatic diseases, urinary tract disorders, skin diseases, parasitic diseases, worms, jaundice, diarrhea, dysentery, indigestion, hemorrhoids and nipple ulcers [1].

Oleo Gum resin is a natural product and combination of essences, resins, and gums which is extracted from various parts of plants with different methods. The stems are scratched to secrete oleo gum resin [2].

This material is initially in liquid form which is hardened gradually in presence of air. Frankincense is formed in various shapes: sheets, wires and small or large pieces with various colors and pleasant smell. Frankincense resin has boswellic acid and other pentacyclic triterpenoids which has a chemical structure similar to steroids. This plant is used in many countries as an anti-inflammatory, analgesic, and anti-arthritis drug. It is also used for treatment of allergy, inflammation of bronchi (bronchin), tumors, sores, fever, diarrhea and vomiting and to enhance memory [3]. Singhet et al. (2008) reported that boswellic acid is a natural compound obtained from frankincense which has four kinds of acids which are used as anti-inflammatory, immune booster, anti-tumor, anti-asthma and in the treatment of Cornwall. Anti-inflammatory effects of frankincense have been ascribed to its triterpenoids4 Beta boswellic acid and its derivatives [4].

Anti- inflation properties of frankincense have been proven in laboratory animals and anti-arthritis effects of it have been reported in laboratory mice. A mixture of boswellic acid plus its derivatives is used in India as anti-arthritis [5].

Few studies are extant about toxicity of frankincense. There is no extant report of negative effects of this plant on respiratory, neural and cardiovascular systems. In view of chemical drugs' side effects and high costs of them, medicinal plants are considered highly these days. Therefore, the effects of this plant on male reproductive physiology were evaluated in this study to find the performance of this plant and its probable medicinal effects.

EXPERIMENTAL SECTION

The study was carried out in animals' room of Payam-e-Noor university Isfahan center in 2015. The room was disinfected. Polyethylene cages were washed, sterilized and placed in the room. Temperature was adjusted at 25±1$^{°c}$ (optimum temperature) by using a heater.

Fifty female mature mice (Balb/C) from the weight range of 30±2g were divided into five groups with ten mice in each group.

Groups were:
- Control: without any extract
- Placebo: received normal saline to ensure that injections will not affect the results
- Three experimental groups: received 50,100, and 200 mg/kg doses of extract in peritoneum. Injections were done for 20 days every other day.

At the end, blood samples were taken and levels of reproductive hormones including testosterone, FSH, and LH were measured.
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RESULTS AND DISCUSSION

- **Testosterone amount**

Mean comparison of testosterone showed significant difference ($p<0.05$) of third experimental group (200mg/kg) with control group.

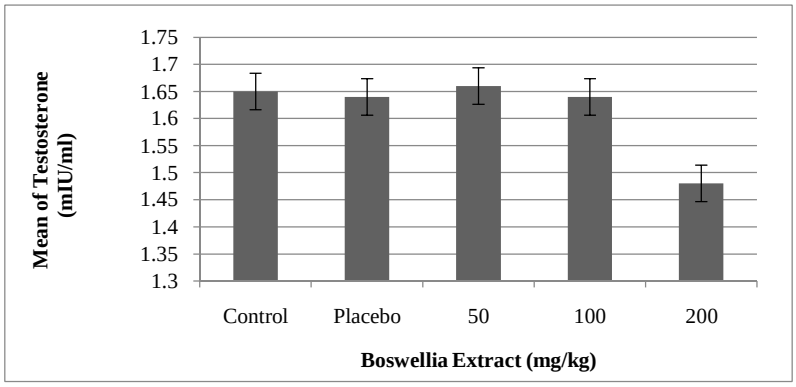

Figure1. Testosterone amount in control and experimental groups

- **FSH amount**

The amount of FSH (mLU/dl) was increased in second and third experimental groups significantly ($p<0.05$) in proportion to control group.

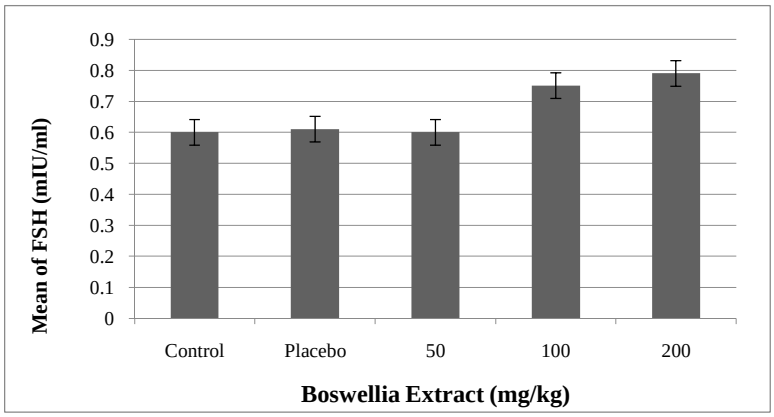

Figure2. FSH amount in control and experimental groups

- **LH amount**

LH level of blood serum (mLU/dl) was not different statistically in various treatment groups.

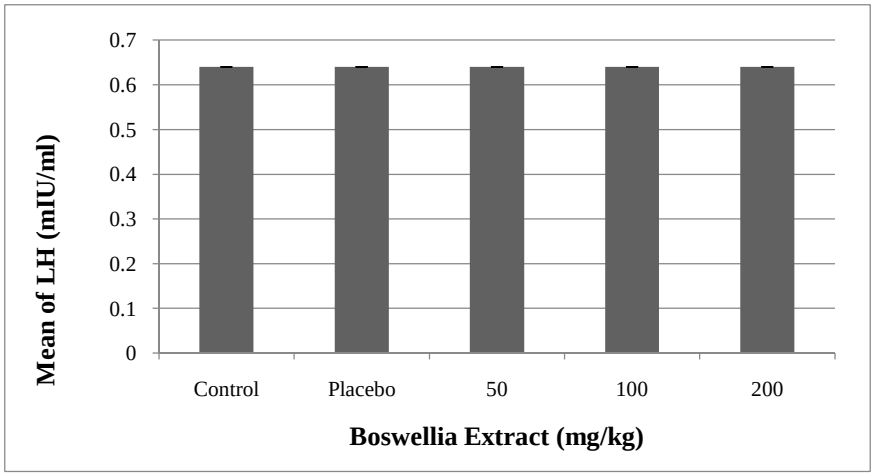

Figure3. LH amount in control and experimental groups

The number of spermatocytes was reduced in third experimental group significantly ($p<0.05$). FSH hormone Activates spermatogenesis and convert spermatogonial stem cells to spermatocytes and eventually sperm by stimulating proliferation of epithelial cells of seminiferous tubules. FSH stimulates cyclase, increases cAMP and causes secretion of ABP (androgen binding protein) by binding to the sertoli cells. This protein binds to testosterone and conducts the androgen to the seminiferous tubules for spermatogenesis. The process will be reversed by FSH reduction [7].

In other researches, spermatocytes reduction and the effects of plants on this reduction have been studied. LH amount was not different in various treatment groups. The amount of FSH was increased in second and third experimental groups [8].

Pituitary-gonadal axis is affected by various neural-hormone factors. One of factors which are in charge of regulating secretions of this axis is norepinephrine. The ends of noradrenergic axons in the brain are in the vicinity of GnRH gonadotropin releasing cells in front hypothalamus. Secreted norepinephrine from these neurons increased GnRH in rats by affecting hypothalamus [7].

In other researches, reduction of LH and FSH and the effects of plants on these reductions have been studied.

Testosterone showed significant reduction in third experimental group (200mg/kg). Hypothalamus causes gonadotropins (LH, FSH) secretion by secreting GnRH releasing hormones and stimulating front pituitary [9].

LH increases androgen (testosterone) secretion via affecting testicular leydig cells. Reduction of this hormone causes reverse process. By increasing androgen hormones this axis regulates and controls testosterone secretion via feedback effects. Increase in testosterone amount affects hypothalamus and controls lutein releasing hormone and partly follicle stimulating hormone via negative feedback mechanism. Low blood testosterone levels also remove inhibitory effects of testosterone on the hypothalamus and testosterone secretion returns to its natural state [10]. The reason of testosterone reduction is FSH decrease. FSH stimulates cyclase, increases cAMP and causes secretion of ABP (androgen binding protein) by binding to the sertoli cells [7]. This protein binds to testosterone and conducts the androgen to the seminiferous tubules for spermatogenesis. In this study, testosterone amount was decreased significantly in third experimental group (200mg/kg) which can be due to phytoestrogen effect on testosterone synthesis.

CONCLUSION

According to results, frankincense's extract has dose dependent effects on male reproduction system and can have anti-fertility effects by reducing spermatogenesis.

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