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Research Article

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The effects of frankincense's hydro alcoholic extract on pituitary-gonadal axis in female mice

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ABSTRACT

Frankincense, is a resin obtained from Boswellia carteri plant. Previous researches have shown medicinal effects of this resin on wide range of diseases. This study was carried out to investigate the effects of frankincense's hydroalcoholic extract 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/kg 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, LH and FSH amounts were decreased by increasing the estrogen. Considering the results, frankincense extract can affect female mice reproduction system dose dependently and can have antifertility properties.

Keywords: Frankincense extract, reproduction, sexual hormones, female mice

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INTRODUCTION

For all creatures, reproduction is the basis of generations' survival. In recent years the use of medicinal plants has been seriously considered around the world. These plants play important roles in diseases treatment and have less, controllable side effects. Medicinal plants are available sources of very effective matters which are similar to materials used in the metabolism of the human body and therefore can be absorbed easily [1].

Bosewellia is a medicinal plant from sapindales order. *Boswellia tharifera* is a small densely branched shrub with compound leaves consisting of 7-15 leaflets. Leaflets are denticulate and similar to oak leaves. All plant is covered by cotton fluffs. This plant is distributed in Arabia and Ethiopia.

Chemical compounds of frankincense depend on species and collecting time but it generally includes 25-32% of gum insoluble in alcohol, 60-70% resin, and the rest is kind of essence[2].

Alcohol insoluble part includes arabin and basorin whereas alcohol soluble part has olibanugen and a group of mono, di, and triterpens [3].

Boswellic acid is a group of pentacyclic 4- triterpenoids and is main ingredient of frankincense resin which is found freely or in combination with other materials [4].

Important derivatives of boswellic acid are: beta boswellic acid (BA), 3-acetyl beta-boswellic acid (ABA), 11-keto acid boswellic (KBA) and 3-acetyl-keto-beta 11 boswellic acid (AKBA) [5].

Olibunam is astringent and is good to enhance memory. It is also useful for internal- external bleedings and in company with Arabian resin is effective for bad sells of nose, asthma and chronic coughs. Using frankincense by pregnant women has been recommended from ancient time to enhance infants' memory. Researches on 100 pregnant women showed that overdose of this matter for 3-4 month before pregnancy produced hyperactive children whereas but mothers who have used frankincense for a month or less had non-hyperactive children which were smart [6].

Extant essences in frankincense have relaxant effect on vascular muscles, especially cerebrovascular and relieve spasm and narrowing of arteries and therefore provide better blood supply to cells. Frankincense affects estrogen secretion and has been used as ovarian cancer drug for a long time. This resin has been known from ancient ages and has been used as fragrant incense. It has been used in Iran to disinfection and as incense. In Avesta, it is mentioned as an effective drug for many diseases including cancer, nausea and memory Improvement [6].

Considering high phytoestrogen amounts of frankincense, this study was carried out to evaluate the effects of frankincense extract on some sexual hormones of female mice.

EXPERIMENTAL SECTION

The study was carried out in animals' room of Payam-e-Noor university-Isfahan center (2015). The room was disinfected. Polyethylene cages were washed, sterilized and placed in the room. Temperature was adjusted at $25\pm1^{\circ c}$ (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. In view of recommended doses of frankincense's extract, following groups were considered:

- 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 estrogen, progesterone, FSH, and LH were measured.

To regulate sexual cycle, mice received 0.1 microgram of cloprostenol injection in peritoneum at first and three days later, 0.2 microgram of progesterone was injected under skin.

RESULTS AND DISCUSSION

Hormones measurement

- **FSH amount**

The amount of FSH hormone was decreased significantly in three experimental groups ($p<0.05$) in proportion to control group (Figure 1).

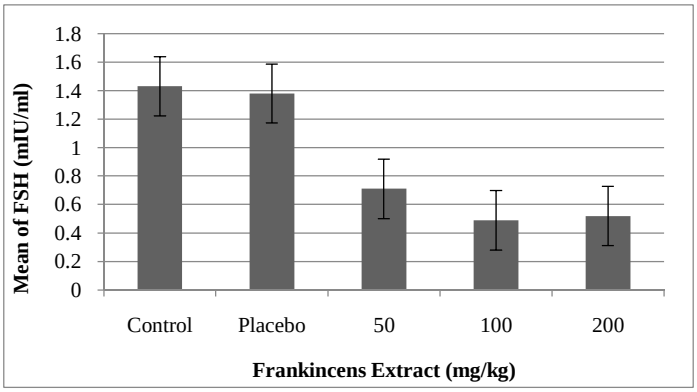

Figure1. FSH amount in control and experimental groups

- **LH amount**

The amount of LH hormone showed significant reduction in all three experimental groups ($p<0.05$) in proportion to control group (Figure 2).

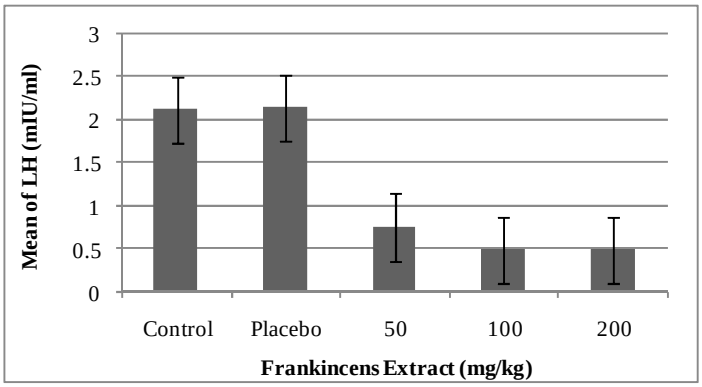

Figure2. LH amount in control and experimental groups

- Estrogen amount

Mean comparison results of estrogen amount in experimental groups showed significant increases in these groups ($p<0.05$) which this increase was significant in second group (Figure 3).

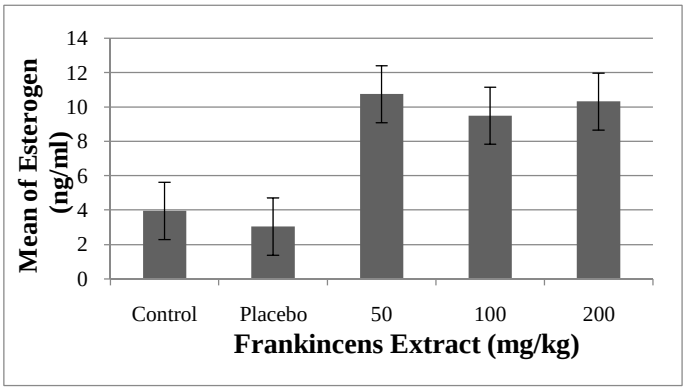

Figure3. Estrogen amount in control and experimental groups

- Progesterone amount

Mean comparison results of progesterone amount in experimental groups showed significant increases in these groups ($p<0.05$).

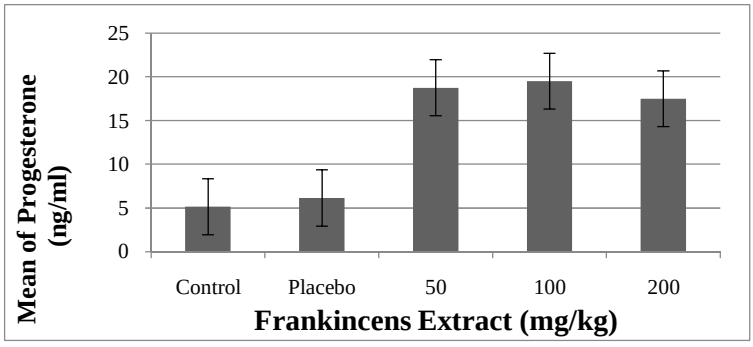

Figure4. Progesterone amount in control and experimental groups

According to results FSH amount was reduced in treatment groups. By reducing FSH level of follicle fluid, the amount of IGFBP 5/4 (from follicles growth influencing factors) will be increased and the activity of proteases will be controlled, therefore FSH antagonists will be increased and follicles' atresia will occur. GnRH also stimulates IGFBP 5/4 production in granulosa cells of follicle and reduces also IGFBP protease; this causes follicular atresia.

On the other hand, secretion of aromatase controlling protein from dominant follicle prevents the growth of other follicles and causes atresia. Furthermore, low concentrations of Follicular fluid leptin have negative effects on growth and development of ovules [7].

The amount of corpus luteum was decreased significantly. Considering the reduction in the number of follicle graphs and corpus luteum folliculogenesis prevention seems logical.

LH amount was decreased in all experimental groups. The reason can be explained as follows: LH is regulated via pituitary- gonadal axis by negative feedback and controlling of sexual hormones; therefore increase in estrogen and progesterone hormones reduce the secretion of LH stimulating hormone from front pituitary which leads to decreased LH amount [8].

Progesterone amount was increased significantly in all experimental groups. Considering the reduction of follicle graphs numbers, the increment was probably due to high estrogen synthesis in remained follicles which caused high estrogen amount. Progesterone amount had significant increase which is in relation to carpus luteum and proves dose dependent effect of frankincense extract [7].

CONCLUSION

According to results, increase in estrogen secretion caused negative feedback of pituitary gonadal axis and reduced LH and FSH amounts. On the whole, frankincense showed dose dependent antifertility effects on mice.

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