

## The Effect of Betamethasone Injection on Sexual Hormones Concentration in Female Mice

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**Abstract:** Betamethasone stimulates production of necessary enzymes for reducing inflammatory responses. This drug is a long-acting steroid which produces quick anti inflammatory effects with long time effect. Effects of betamethasone on sexual hormones of female mice were studied in this study. Mice were divided in five groups (control, placebo and three treatments groups) with ten members in each group. Samples were kept in similar condition be synchronized in estrus cycle. Betamethasone was prepared in 0.1, 0.5 and 1 mg kg<sup>-1</sup> doses and injected in peritoneum for 20 days. Control group was not injected while placebo received normal saline. After ten injections blood samples were prepared and the amounts of LH, FSH, strogen and progesteron hormones were evaluated by RIA Method. Obtained results showed that strogen, progesterone and LH were reduced by all treatment significantly whereas FSH was increased in 0.5 and 1 mg kg<sup>-1</sup> groups. According to results, betamethasone affects sexual hormones dose dependently and then can affect female sexual potential.

**Key words:** Betamethasone, LH, FSH, strogen, progesteron, mice

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### INTRODUCTION

Reproduction process includes a combination of physiological events which occur in their appropriate time. Endocrine system controls the timing of these processes via producing hormones (Rabin *et al.*, 1990). By environmental stresses, reproduction process will be affected severely and animals will be in extinction danger. Physiological pressures like drug injection, heat stress, pregnancy period (especially in late gestation) and lactation period play important roles in reduction of reproduction capacity of female animal. Measurement criteria of reproduction quotient includes the number of insemination rate per pregnancy, pregnancy amount per first insemination, the number of open days and calving interval.

Betamethasone is one of anti inflammatory drugs. This drug changes DNA translation which changes cell metabolism and reduces inflammatory response. This drug is used for reducing short time pains of non-infectious inflammations. It has high anti inflammatory effect and researchers have proposed to study preference of bethametasone to dexametasone (Jobe and Soll, 2004). Betamethasone a corticostroide which is given for lung maturity in pregnancies which are in miscarry danger. It is used in 24-34 weeks of pregnancy and causes

reduction in probability of respiratory distress syndrome and mortality percentage of intracranial hemorrhage and increase in viability of the premature infant. Bethamethasone affects pneumocytes type 2 of embryo's lung and helps alveolar surfactant and lung compliance (Gamsu *et al.*, 1989). Glucocorticoides can improve the response of weak responders indirectly by increasing serum level of growth hormone and IGF-1 and following increase in IGF-1 concentration in follicle liquid (Casanueva *et al.*, 1990). Those have direct effects on ovarian steroidogenesis both in body and in laboratory (Ben-Rafael *et al.*, 1988; Hsueh and Erickson, 1978; Michael *et al.*, 1993). Also one of probable mechanisms which pituitary-adrenal axis may affect reproduction performance is direct effect of glyocorticoides on target tissue (Rabin *et al.*, 1990).

According to the above mentioned this study carried out to investigate the effects of betamethasone injection on reproduction hormones of female mice.

### MATERIALS AND METHODS

Little laboratory female mice were prepared in 25-35 g weight range and divided in five groups with ten members in each group. Samples were kept in similar condition. Samples were kept in separate cages for 2 weeks with free

access to natural light, food and water and 25-35°C temperature. This condition was continued also in injection period. Betamethasone was injected in peritoneum according to body weight:

- First treatment group: 0.1 mg kg<sup>-1</sup> of body weight
- Second treatment group: 0.5 mg kg<sup>-1</sup> of body weight
- Third treatment group: 1 mg kg<sup>-1</sup> of body weight
- Placebo: Normal saline 9%
- Control: No injection
- All injection was done for 20 days every other day between 8-12 o'clock

To evaluate the effect of drug, all samples must be synchronized in estrus cycle. First, 0.5 µg of cloprostenol drug was injected in peritoneum. After 3 days, 3 µg of progesterone was injected under skin and 1 day later drug injection was started.

**RESULTS AND DISCUSSION**

FSH amount (mIU/dL) showed significant increase (p<0.05) in 0.5 and 1 mg kg<sup>-1</sup> treatments. LH amount was decreased in all experimental groups significantly (Fig. 1). Estrogen hormone was reduced in all experimental groups significantly (p<0.05). Also progesterone amount of all three treatments was decreased significantly (p<0.05) in proportion to control group (Fig. 2).

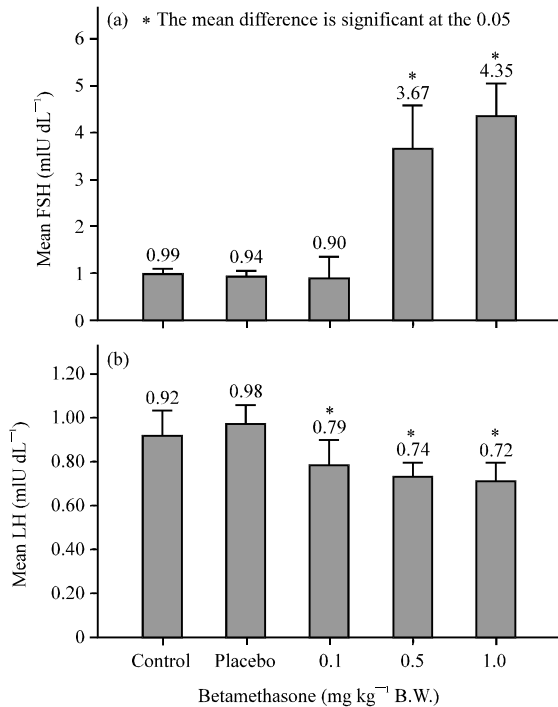


Fig. 1: a, b) LH and FSH amounts in studied groups. Error bars: 95% CI

Considering the results, LH amount was reduced in all treatment groups. LH is regulated by negative feedback and by controlling secreting sexual hormones via pituitary-gonadal system. Therefore, increase in estrogen and progesterone reduces LH secretion from anterior pituitary which is resulted in LH reduction (Ben-Rafael *et al.*, 1988). GnRH hormone from hypothalamus stimulates secreting LH from pituitary and LH causes stability of corpus luteum and therefore increases in progesterone secretion. But in this study, betamethasone caused instability of corpus luteum by controlling LH secretion and therefore reduced progesterone secretion (Hsueh and Erickson, 1978).

FSH was increased in two experimental groups significantly. Considering that GnRH hormone from hypothalamus stimulates FSH secretion from front pituitary and this hormone in ovary increases follicle growth and then increases estrogen in ovary, a negative feedback is produced and reduces FSH secretion from front pituitary (Michael *et al.*, 1993). Betamethasone reduced ovarian estrogen in this study and prohibited negative feedback for FSH, therefore FSH was increased in experimental groups. Progesterone controls production of follicle stimulating hormone highly and it seems that opioid peptides of brain are mediator of this negative effect.

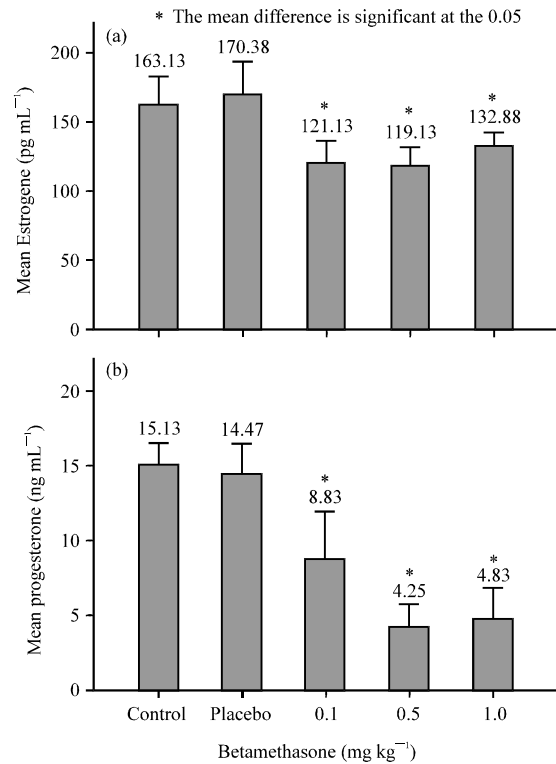


Fig. 2: a, b) Estrogen and progesterone amounts in studied groups. Error bars: 95% CI

Obtained results showed that amount of estrogen hormone in granulosa cells of follicle are responsible of estrogen production of ovary. At first, some small antral follicles start to grow and make estradiol. Some of these follicles will undergo atresia (Rabin *et al.*, 1990). From remaining follicles, dominant follicle is selected and the highest amount of estradiol is being secreted in this stage. On the other hand, inhibine hormone in dominant follicle controls FSH secretion specifically.

### CONCLUSION

Considering the results, betamethasone reduces estrogen secretion which causes instability of corpus luteum in ovary and reduces progesterone production. Also this drug reduces estrogen production by follicles and therefore FSH negative feedback is not occurred and increases FSH production. On the whole betamethasone can affect sexual potential of female sex dose dependently.

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