RESPONSE OF THE ADULT FEMALE RATS TO OVARIECTOMY AS DETERMINED BY LUTEINISING HORMONE RADIOIMMUNOASSAY

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This study was carried out to see the response of ovariectomy in adult female rats as determined by rat Luteinising Hormone (rLH) Radioimmunoassay (R1A). Animals were divided in two groups. Group I (control, n=6) were sham ovariectomised and group II (experimented, n=4) were ovariectomised. Next day at 1400 hours' rats were sacrificed and their plasma was collected for rLH, RIA. It was observed that there was highly significant increase in plasma rLH (P<0.001) in experimental group as compared to controls. Also the increase in the weights of hypothalamus and anterior pituitary of experimental group was highly significant (P<0.001) as compared to controls. This shows that this rise in plasma rLH and weights of hypothalamus and anterior pituitary was due to loss of negative feedback effect of ovarian steroids.

INTRODUCTION

It is becoming increasingly evident that LHRII is secreted episodically into the hypothalamo-hypophyseal portal system for delivery to the anterior pituitary gland. This provides direct evidence for a hypothalamic mediation of the circhoral LH rhythm.[1]

In the female, the ovaries are the major source of oestrogen, progesterone and of minor quantities of androgens. In the male, the testes produce, besides a variety of androgens, small amounts of oestradiol, oestrogen and progesterone. Thus, both the male and the female produce the same classes of steroids, though in different quantities and in a different pattern, tonically in the male and cyclically in the female.

These steroid hormones are known to have a profound effect on the secretion of LH in sheep,[2,3] human beings/ monkeys[5] and rats[6,7].

The most direct evidence demonstrating that an interplay exists between gonads and pituitary, comes from experiments in which gonadectomy is performed.

In this study we ovariectomised the rats and observed its effects as determined by rat Luteinising Hormone (rLH) Radioimmunoassay (RIA).

MATERIALS AND METHODS

Experimental Animals

Adult female Albino rats weighing 100-200gm each were subjected to this study. They were kept at a temperature of 21°C ± 5°C and lighting (10 hrs/14 hr: light/dark cycle: lights on at 0700 hrs, off at 1700 hrs) and were given food and tap water ad labitum.

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Grouping of Rats

I (n=6) Control group

II (n=4) Experimental group

Methods

Bilateral ovariectomy was earned out under ether anaesthesia of experimental animals (group II) by the technique of Khan et al[8]. The control group I, was sham ovariectomised, i.e. abdomen was opened ovaries were handled and abdomen was closed. Next day at 1400 hours' rats were decapitated, plasma for rat Luteinising Hormone (RLH) was collected- and hypothalamus and anterior pituitary were removed for weighing.

Radioimmunoassay for Rat Luteinising Hormone

The rat Luteinising hormone was measured by a double antibody radioimmunoassay based on the principle described by Monroe et al[9] with kits supplied by National Hormone and Pituitary Programme, [University of Maryland School of Medicine, National Institute of Diabetes, Digestive and Kidney Diseases (NIDDK)]. The concentration of rLH was expressed in terms of NIDDK rLH-RP-3 as the reference preparation.

Statistical Methods

Results were expressed as mean ± SEM, and significance of difference was analysed by Student's 't' test.

RESULTS

Table-1 shows that there was highly significant (P<0.00l) increase in mean ± SEM weights of hypothalamus and anterior pituitary of ovariectomised as compared to that of sham ovariectomised (sham ovx) rats.

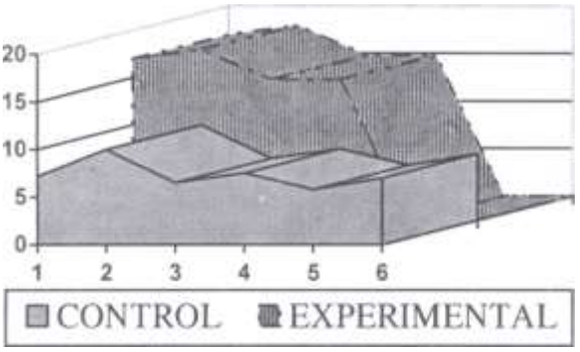
Table-1: Effect of ovariectomy on weights of hypothalamus & anterior pituitary.

Organ	Weight mean ± SEM (mg/100g body weight)	
	Control (Sham ovx) (n=6)	Experimental (n=4)
Hypothalamus	23.28 ±0.87	29.82 ± 1.19
Ant. Pituitary	2.94 ±0.87	6.11 ±0.13

***P<0.001*

It was seen that there was highly significant (P<0.00l) increase in level of plasma rLH in ovariectomised rats as compared to that of sham ovariectomised rats (Fig. 1).

Fig. l: EFFECT OF OVARIECTOMY ON PLASMA rLH.



DISCUSSION

It appears that one of the most crucial factors which enhance the responsiveness of anterior pituitary- gland to LHRH in cycling female rats is oestradiol. whereas progesterone modulates this effect[10]. The most direct evidence demonstrating that an interplay exists between the anterior pituitary gland and ovaries was confirmed by the experiments in which ovariectomy was followed by replacement therapy with ovarian steriods[11,12].

Adult cycling female rats (aged 1.5 to 2.5 months) were used as in vivo studies have indicated that inhibitory effects of oestradiol on gonadotrophin release are fully developed at 28 days of age in the female rats.[13] Results of our study indicated that the most dramatic response to ovariectomy was a prompt (within 24 hours) and striking increase of LH levels in plasma and cellular proliferation of hypothalamus and anterior pituitary- gland. The increase in plasma LI I level was highly significant (P<0.00l) as compared to sham ovariectomized rats. These results are in accordance with the results of Nicholson et al[l4]? who also demonstrated a highly significant rise in plasma LH in ovariectomised rats. This rise in plasma LI I level after ovariectomy was due to loss of negative feedback effects of oestradiol[1^] and progesterone[16].

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