

## 5- HTP and L-DOPA ADMINISTRATION INFLUENCE REPRODUCTIVE STATE IN DOMESTIC PIGEON, COLOUMBA LIVIA DOMESTICA

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**ABSTRACT** : Adreno gonadal hypothalamo hypophyseal axis was tested in female monogamous bird domestic pigeon *Columba livia domestica*. Two neurotransmitter precursor drugs (5-HTP and L-DOPA) were used at different time intervals. Female birds were divided in to three groups, having eight individuals in each group. Group 1 was control group received only vehicle. Group II was 0 hr group administered with 5-HTP and L-DOPA at 0 hr interval. Group III was 8 hr group and received these neurotransmitter precursor drugs i.e. 5-HTP and L-DOPA at 8 hr interval. Quantity of doses was 0.5mg/ kg body weight in 0.1 ml normal saline. Experimentations were terminated after 13 days and results were obtained 45 days after experimentation. 0 hr group showed significantly stimulatory ( $P<0.05$ ) responses in body weight and plasma estrogen level, while 8 hr group showed significantly inhibitory ( $P<0.05$ ) effect in comparison to control. Cholesterol and ascorbic acid contents in ovarian follicles and adrenal gland were found significantly low ( $P<0.05$ ) in 0 hr group while significantly high ( $P<0.05$ ) in 8 hr group in comparison to control. Regressive stages of adrenal gland by administration of neurotransmitter precursor drugs at 8 hr interval and progressive stages at 0 hr interval indicate possibility of changes in temporal synergism between adreno- gonadal axis of hypothalamus. Also, it may exert reproductive stress with and without season of reproduction in this seasonal bird.

**KEYWORDS** : 5-HTP, L-DOPA, Pigeon, Adrenal gland, Reproduction

### INTRODUCTION

Adrenal gland is most sensitive endocrine gland towards environmental stimuli in avian system. The complex working of gland makes this gland sensitive towards body organization and external environment. Seasonal activities in natural environment of different birds with special reference to adrenocortical and gonadal tissues were found to be either parallel, inverse or have no relation with each other<sup>2,7,8</sup>. Activity of hypothalamohypophysial-adrenal-axis has been regulated by emotional and traumatic stresses and external stimuli like photoperiod and temperature fluctuation<sup>10</sup>.

Interrelationship/ interdependence of neural oscillators and unconcealed

rhythms and seasonal variation in circadian rhythms and their phase relationship of serotonergic and dopaminergic activity may modulate seasonal reproductive conditions. Current study was intended in such type of avian species which is monogamous and produces crop milk for the period of brooding. The effect of hour relationship was tested on adreno-gonad interrelationship in female domestic pigeon, *Columba livia domestica*.

### MATERIALS AND METHODS

During the progressive phase of reproduction (December) 24 female pigeons were selected out by lateral laparotomy from the group of

acclimatized birds. They were divided into three groups of 8 birds each. Group I acted as the control group and received two daily injections of normal saline. Group II was 0 hr group in which birds received daily injection of 5-HTP (5-Hydroxytryptophan, a precursor of serotonin) and L-DOPA (L-Dihydroxyphenylalanine, a dopamine precursor) 0 hr apart i.e. at the same time at 8:00 AM. Group III was 8 hr group, where birds received daily injection of 5-HTP (5-Hydroxytryptophan, a precursor of serotonin) at 8:00 AM and L-DOPA (L-Dihydroxyphenylalanine, a dopamine precursor) 8 hr later i.e. at 4:00 PM. Drugs were administered at the dose of 5mg / 100 gm body weight in 1 ml normal saline for 13 days. After 45 days at termination of experiment, body weight was recorded. Blood was obtained directly from left ventricle of heart for hormone assay (Estrogen). Freshly dissected tissues (ovarian follicle and adrenal gland) were processed for the estimation of the cholesterol<sup>11</sup> and ascorbic acid<sup>9</sup>. Experiments were run in triplicate and only consistent results were considered. Data were statistically analyzed by student 't' test<sup>1</sup>. The work is in the knowledge of departmental ethical committee. Birds were handled gently causing no cruelty.

## RESULTS AND DISCUSSION

Results revealed that body weight of 8 hr group significantly declined while 0 hr group significantly gained ( $P < 0.05$ ) in comparison to control (Fig.1). Plasma estrogen also revealed the same patterns i.e. 8 hr group had significantly lower ( $P < 0.05$ ) level while in 0 hr. group significantly higher ( $P < 0.05$ ) level (Fig.2). Cholesterol content of both ovarian follicle (Fig.3) and adrenal (Fig. 4) was found significantly higher ( $P < 0.05$ ) in 8 hr group and significantly lower ( $P < 0.05$ ) in 0 hr group in comparison to control. Like cholesterol, ascorbic acid is also found significantly higher ( $P < 0.05$ ) in 8 hr group and significantly lower ( $P < 0.05$ ) in 0 hr group in both the tissues. (Fig.3 & 4).

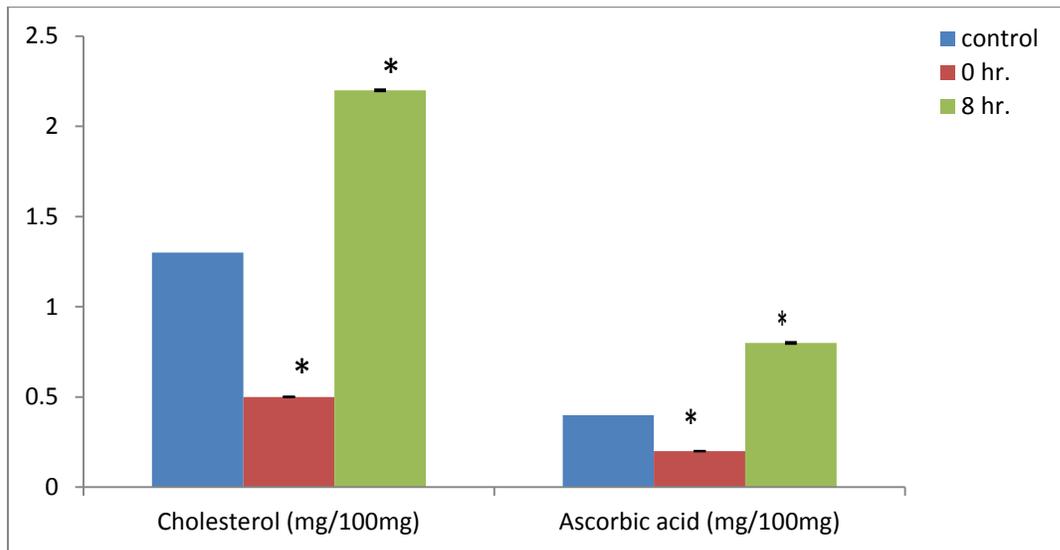
Regressive stages of adrenal gland by administration of neurotransmitter precursor drugs at 8 hr interval and progressive stages at 0 hr interval may possibly indicate changes in the temporal synergism between adreno- gonadal axis of hypothalamus. This is mere speculation as further detailed study is needed to know the actual factors.

Cholesterol is the precursor of estrogen<sup>3</sup>. High accumulation of cholesterol within the ovarian follicle in 8 hr group and low amount of cholesterol in 0 hr group indicates that it plays a vital role in steroidogenesis in the ovaries and adrenal glands in pigeon. Ascorbic acid level was very low in 0 hr group and the high level was recorded 8 hr group. Role of ascorbic acid in the process of oogenesis is well-

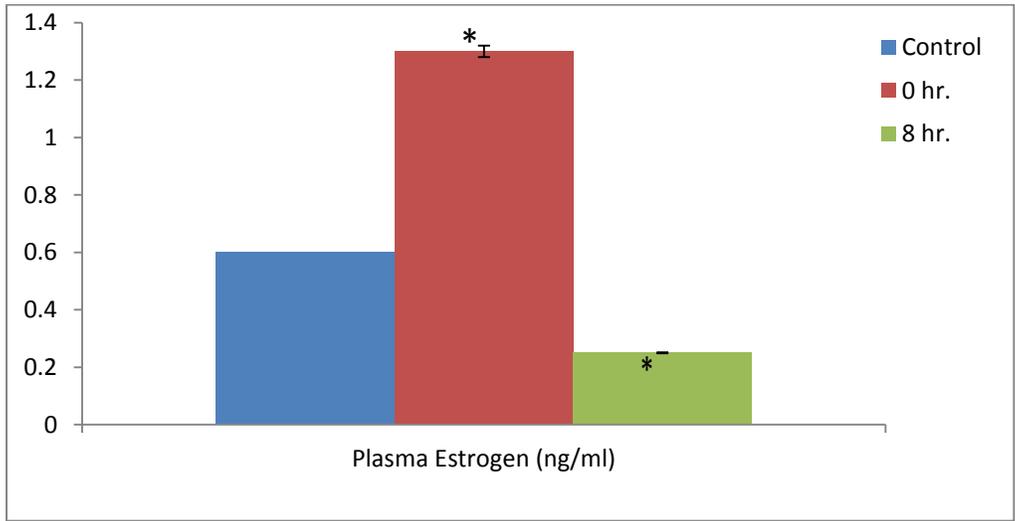
known<sup>6</sup>. It is also reported Noach and Van Rees<sup>4</sup> that ascorbic acid may either be specifically concerned in the production of corticoids or in the formation of steroid hormones from their precursors. In the present study, the high concentration of ovarian ascorbate in 8 hr group may exert

a negative influence on steroid biosynthesis. It is also possible that stoppage of steroid biosynthesis results in cholesterol accumulation in both tissues. All results of 8 hr group showed inhibitory responses and stimulatory effect in 0 hr group may be due

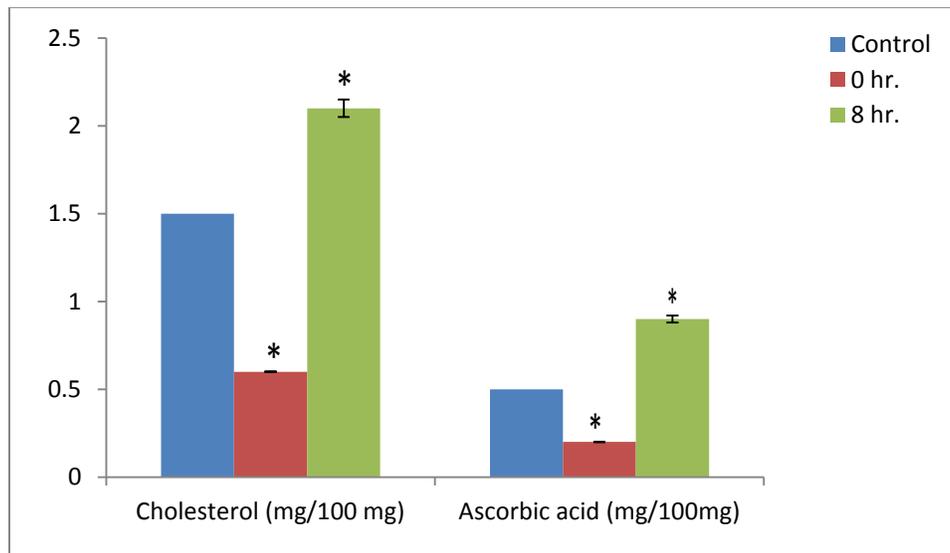
**Fig 1: Effect of 0 hr and 8 hr temporal relationships of 5-HTP and L-DOPA on the body weight level of Domestic pigeon. (n=8, mean  $\pm$ SEM, P<0.05)**



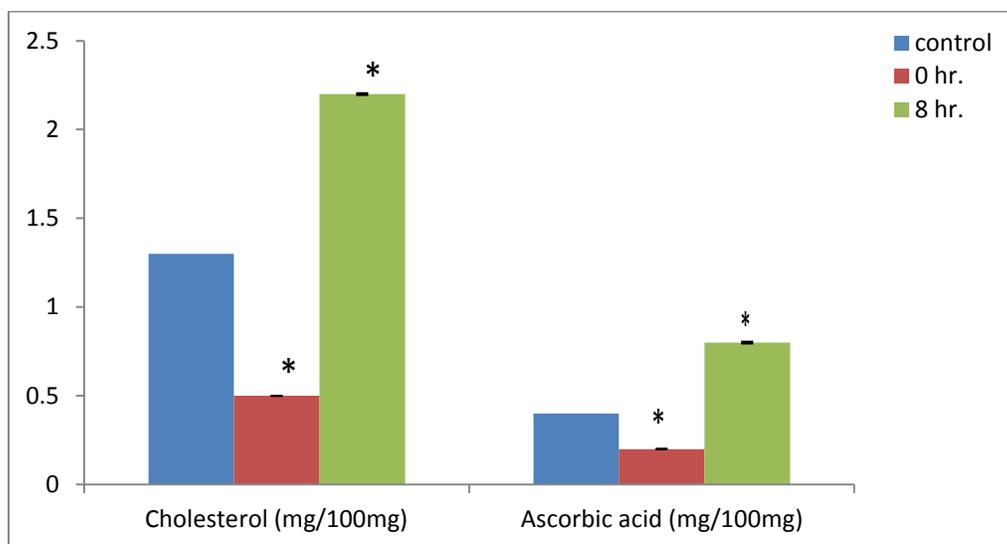
**Fig 2: Effect of 0 hr and 8 hr temporal relationships of 5-HTP and L-DOPA on the plasma estrogen level of Domestic pigeon. (n=8, mean  $\pm$ SEM, P<0.05)**



**Fig 3: Effect of 0 hr and 8 hr temporal relationships of 5-HTP and L-DOPA on the cholesterol and ascorbic acid content in ovarian follicle of Domestic pigeon. (n=8, mean  $\pm$ SEM, P<0.05)**



**Fig 4: Effect of 0 hr and 8 hr temporal relationships of 5-HTP and L-DOPA on the cholesterol and ascorbic acid content in adrenal gland of Domestic pigeon. (n=8, mean  $\pm$ SEM, P < 0.05)**



interval and progressive stages at 0 hr interval may possibly indicate changes in the temporal synergism between adreno-gonadal axis of hypothalamus. This is

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