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Effect of different doses of Estradiol on Ovarian and Oviducal response of photostimulated, photosensitive and photorefractory redheaded bunting under long photoperiod

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Original Research Article

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Abstract: In view of the changed observed in photoperiodic response system (PRS) of the birds it is aimed in the present investigation, to validate the effect of climatic factors under the influence of hormonal treatment. The investigation was carried out using female hormone (Estradiol Benzoate commercial available as estradiol).The hormone treatment is given in different doses as describe earlier using photosensitive, photo stimulated and photo refractory birds.
Keywords: Estradiol, Ovarian, photostimulated, photosensitive, photorefractory, redheaded bunting, photoperiod

INTRODUCTION

In several species of birds, in both the sexes, various aspects of photoperiodic control of reproductive cycle such as photoperiodic threshold for induction of gonadal activities, nature and extent of gonadal photostimulation, phenomenon of photo-refractoriness and co-ordinations between the photoperiod and other environmental stimulus have widely investigated [2-4,7,8,17-19].

Under Artificial day lengths, a long photoperiod (>11.5/Day) stimulates gonadal growth, development, and an increase in plasma levels of LH [12].

MATERIALS AND METHOD

The Redheaded bunting, *Emberiza bruniceps* is along distant palaearctic Indian migratory small passerine finch (Family Emberizidae, Order Passeriformes) that breeds in West Asia and East Europe and overwinters in India [1]. Female redheaded bunting is dull looking ashy brown head (above), buffish washed with yellow (below) and under tail-coverts yellow.

Adults birds were captured from the field and maintained under Natural Day Lengths (NDL) in captivity, fed with paddy grains, *Oryza sativa*, sometimes Kakoon, *Seatria italica* .Food and water were changed daily and available at all the times in the cups attached with wire net cages.

Birds were given hormonal treatment of Estradiol in different doses. Estradiol was injected in doses of 50µg, 100 µg and 200 µg. The hormone was dissolved in suitable solvent. The stock solution thus prepared was used for to prepare different concentrations .Hormonal treatment was given by injecting the doses of hormones in 0.1 ml vehicle. Injections were made in the chest and thigh muscles of the birds alternatively. The control birds were injected by vehicle alone.

Ovarian weight was estimated by comparing the sizes of ovary with another standard set of fixed ovaries of known weights [15].

The data is presented as mean and standard error (mean ± S.E.) for all quantitative values. Ovarian weight was compared with their own initials and within the group by student's *t-test* [6].

EXPERIMENTS AND RESULT

The hormone treatment is given in different doses as describe earlier using photosensitive, photo stimulated and photo refractory birds. Ten (10) alternative injection were made and the experiments were terminated on 21st day, at least 05 birds (n=5) were maintained in during experiment. Three experiments were performed in this study.

Experiment No. 01

In this study the photosensitive birds which have already given four weeks of 8L: 16D (08 Hours of light and 16 Hours of dark) treatment, were used. Injection of 200,100 and 50 microgram (µg) was given in 0.1 ml vehicle (Olive Oil), vehicle injected group served as control 10 alternative injection of each doses were given (Estradiol).

The estradiol suppressed ovarian growth irrespective of the doses. The value of the ovarian weight in control groups indicated that the weight was significantly higher (P<0.001)as compared to the hormone treated groups(Table no.01).The weight of oviduct was increased in all the hormone injected bird and the values were greater than three initial control and vehicle injected birds.

Experiment No. 02

In this study photo stimulated birds were used .Before the commencement of experiment female birds were exposed for three weeks under 16L:08D (16 Hours of light and 08 Hours of dark) photoperiods, to bring about photostimulation.

The photo stimulated ovaries went regression under the influenced of the hormone of all doses,the weight of the ovary remain significantly higher(P<0.001) in control birds as compared to hormone treated birds(Table no.02).The oviducal weight was found increased in all groups .The increment of oviducal weight was higher in hormone treated birds than the control.

Experiment No. 03

Before the experiment, birds were exposed to 16L: 08D for four months .The quiescent refractory ovary did not show any growth and their value remained similar as their initials (Table no.03).

Table-1: Photosensitive

Estradiol Treatment(µg)	Initial Ovarian Weight(gm) [Mean ± SE]	Final Ovarian Weight(gm) [Mean ± SE]	Oviducal Weight(mg) [Mean ± SE]
200	2.86 ± 0.12	4.06 ± 0.64	58.64 ± 5.22*
100	3.90 ± 0.16	4.20 ± 0.56	60.28 ± 6.48
50	3.66 ± 0.12	3.98 ± 0.48	48.36 ± 5.82
Control	3.10 ± 0.10	28.60 ± 1.26	22.06 ± 2.64
Initial Control			1.26 ± 0.20

*P value< 0.001

Table-2: Photostimulated

Estradiol Treatment(µg)	Initial Ovarian Weight(gm) [Mean ± SE]	Final Ovarian Weight(gm) [Mean ± SE]	Oviducal Weight(mg) [Mean ± SE]
200	24.12 ± 0.44	6.80 ± 1.02	53.42± 3.64
100	22.80 ± 2.46	8.14 ± 2.28	48.24± 2.24
50	23.78 ± 0.82	4.78 ± 0.92	31.32± 8.72*
Control	25.60 ± 1.72	19.20± 2.78	12.60± 3.26
Initial Control			18.42± 1.60

*P value< 0.001

Table-3: Photorefractory

Estradiol Treatment(µg)	Initial Ovarian Weight(gm) [Mean ± SE]	Final Ovarian Weight(gm) [Mean ± SE]	Oviducal Weight(mg) [Mean ± SE]
200	4.06 ±0.18	3.92 ± 0.26	30.0 ± 3.82
100	3.88 ±0.22	3.16 ± 0.28	28.26 ± 4.44
50	3.68 ± 0.16	3.42 ± 0.32	16.12 ± 5.58*
Control	4.20 ± 0.12	3.72 ± 0.38	2.68 ± 0.14
Initial Control			3.02 ±0.64

*P value< 0.001

DISCUSSION

The observation present in table no. 1, 2 & 3 indicates the gonadal steroid some however interrupted with photoperiodic reproductive functions in the redheaded bunting. Our reports support the photoperiodic regulation of such activities in migratory

birds as described by several workers[21,10,16,17]. They are quite in agreement with the concept that the gonadal steroids exert an antigonadal effect during photostimulation. Although differential gonadal responses to exogenous androgen and estrogen are reported which clearly suggest to have anti gonadal, progonadal or no effect in several avian species [4,11,14].

Oviducal hypertrophy in female redheaded bunting under the influence of exogenous estradiol is marked at the end of the hormone injection but in control group it appeared when ovaries acquire growth under normal photostimulation. Increase in oviducal weight in olive oil injected group clearly indicates the high endogenous level of estradiol in photostimulated birds. Similar findings have been reported in many other birds, especially in domesticated species [20,9,13].

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