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Research Article

Morphometric study on Atretic Follicles in the Ovaries of Albino Rats in response to Altered Photo Period

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ABSTRACT

Young Wistar female albino rats were subjected to rhythmic light and dark photo period for an experimental duration of about 4 weeks. Animals were euthanized and ovaries were removed. Organs were subjected to morphometric and morphological and histological studies. The Morphometric readings were calculated and compared with control and experimental groups

1. Introduction

Pineal gland is found to be main regulatory organ modifying the activity of pituitary gland, pancreas, adrenal gland and gonads[1-4]. It is now widely accepted as an endocrine gland and it plays a major role on photo-period of light and dark which is a part of biological rhythm[5]. The main aim of the work is the study the morphometric changes in the ovary of adult Wistar female albino rats subjected to disturbance in the rhythmic cycle of light and dark photo field

2. Materials & methods

Young adult female albino rats weighing about 180-200 grams were used for the study. The animals were provided with food and water ad libitum and were maintained under standard climatic conditions of the environment (25 – 33^{o} C temperature) Animals were grouped into control and experimental having number of 6 each. Control group were subjected to normal light cycle LD at 12:12 hrs and experimental group were maintained in dark light during day time and exposed to light during night time. The experiment was carried out as per schedule (Table 1).

After the experimental period rats of both control and experimental period were sacrificed by euthanasia method using sodium pentobarbital. Ovaries were removed by routine rat abdomen dissection procedure. Tissues were weighed morphological using electronic digital balance. Mean weigh and SD were calculated and readings were compared.

Exp. Period	Dark Cycle	Light Cycle
I Week	6 am – 6 pm	6pm – 6 am
II Week	7 am – 7 pm	7 pm – 7 am
III Week	8 am – 8 pm	8 pm – 8 am
IV Week	6 am – 6 pm	6 pm – 6 am

Volume of the ovaries was measured by water displacement method in a graduated tube containing cold normal saline.

Tissues were stained by routine Haematoxylin & Eosin method and histo-morphometric parameters were measured using ocular micrometer and reticule

Observation

Follicles of control group found to be normal. Follicles remain at the cortex part of ovary and presented follicles of different stages. The number of follicles was found to be average.

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Morphometric analysis

Body weight

It is found to be not much noticeable reduction in body weight in experimental animals when compare to control group.

Weight of control group remains between 180 – 200; wherein the weight of experimental group found to be ranged between 175-200.

Table I: Influence of altered photo-period on body weight
(Mean weight expressed as grams)

S.No	Control	Experimental
1	200	190
2	190	182
3	195	200
4	200	220
5	180	175
6	200	190

Ovary Weight

Weight of ovaries of both control and experimental group were measured using electronic digital balance (SICO popular 884/100, voltage 230 AC). Weight of experimental group found to be little reduced when compared to control group. The readings were measured and tabulated as follows

Table II: Weight of Ovaries
(Values expressed as mean and SD)

S.No.	Control	Experimental
1	25.21±3.11	23.62±2.93
2	31.00±2.30	29.95±2.80
3	26.42±4.48	25.50±4.30
4	27.00±5.04	26.00±6.12
5	30.20±5.98	28.52±5.92
6	28.50±4.50	27.20±4.65

Population of follicles

In the control group, the follicles found to remain in various stages like primordial, primary and secondary according to the day of cycle. More number of matured graffian follicles was also found along with the secondary and tertiary follicles. Very few atretic follicles found to be present that too reaching the cumulus oophorus condition.

Table III: *Population of atretic follicles*
(Values expressed as mean and SD)

S.No.	Control	Experimental
1	461.89±24.34	512.80±25.60
2	450.20±20.00	500.12±20.84
3	437.40±23.60	515.10±21.30
4	460.75±26.35	530.20±20.61
5	440.60±24.20	510.11±22.00
6	500.20±26.11	530.10±20.30

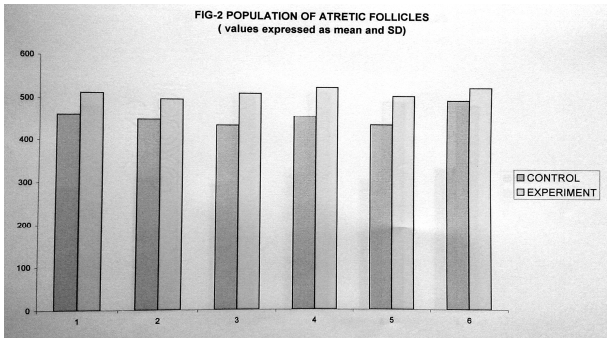

Figure 1: Population of Atretic Follicles
(Values expresses as mean and SD)

The volume density (%) of the atretic follicles were calculated and multiplied with the volume of each organ to get the absolute volume of atretic follicles in each ovary. The morphometric study revealed that the atretic follicle are more in the ovaries of experimental group of rats compared to controls as shown in table IV-Fig.1.

Table IV
(Values expressed as mean and SD)

S.No	Control	Experimental
1	145.25±21.20	242.13±19.20
2	158.32±25.11	250.10±20.00
3	150.20±20.22	255.20±23.20
4	162.10±23.11	260.15±25.32
5	155.20±20.25	250.20±24.00
6	169.22±19.65	245.11±22.40

Discussion & Conclusion

In the previous studies, the animals exposed to constant light[6-12] and alteration of light dark cyclehas showed changes in estrous cyclicity, reduction in ovarian weight and in male rats-testicular and seminal vesicle regression respectively. In the current study the duration of the cycles were maintained as 12:12 hr (no short or long photo period) but day was kept dark and night they were to light and it was observed that there was mild weight reduction in the ovaries of the rats which were exposed to altered photo period.

It was also observed in the present study that corpus luteum was found less in each ovary revealing that the ovulation was also slowed during this inverse photoperiod. Whowing variation from the work done by Cerna. C *et.al* (2000)[3] which resulted in a gradual shift on the annual reproductive cycle, so that the ovulatory cycle was advanced by 5 months in the ewes.

It is concluded that with the above experiments conducted and with the findings, the influence of altered photoperiod had showed significant increase in the atretic follicles and regression in ovarian weight. In addition to that, corpus luteum count was also very less compared to control group of rats[13-15].

Human females on their occupation basis, when exposed to these types of external photo-stimuli over a chronic period would show changes in their ovulation.

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Reference

[1]. Benson B., McAsey ME., An essential role for ovarian inhibin in pineal gland mediated anestrous in Syrian hamsters, Journal of Pineal Research 1998;25:1:5-11

[2]. Brand A & De jond WHR., Qualitative and quantitative micro morphological investigation of the tertiary follicle population during the estrous cycle in sleep, Journal of reproduction and fertility 1973;33:431-439.

[3]. Cerna C., Porras A.,Valencia MJ., Perera G., Zarco L., Effect of an inverse subtropical degrees 13'N) photo period on ovarian activity, melatonin and prolactin secretion in pelibucy ewes Animal Reproduction Science 2000;2;60-61.

[4]. Cvijic G., Janic Sibalic V., Demajo M., Karakasevic A., PertovicVM., Ivanissevic Milovanic OK., The effects of continuous light and darkness on the activity of monoamine oxidase A and B in the hypothalamus, ovaries and uterus of rats, Acta Physiologica Hungarica 1997-98;85:3:269-76.

[5]. Edmonds KE., Stetson MH., Effects of age and photoperiod on reproduction and the spleen in the marsh rice rat (Oryzomys palustris), American journal of physiology. Regulatory, integrative and comparative physiology 2000;280:4:1249-55.

[6]. Koger CS., The SJ., Hinton DE., Variations of light and temperature regimes and resulting effects on reproductive parameters in medaka (Oryzias latipes) Biology of Reproduction 1999;61:5:1287-93.

[7]. Lovegrove BG., Raman J., Torpor patterns in the pouched mouse (saccostomus campestris, Rodentia) : a model animal for unpredictable environments, Journal of Comparative Physiology (B)1998;168:4:303-12.

[8]. Mishra MK., Tewari PD., Photo periodic induction of ovarian growth and plasma estradiol secretion in the migratory Finclo, *Emberiza melanocephala*: involvement of circadian rhythm, Acta Biologica Hungarica 2000;51:1: 31–6.

[9]. Reiter RJ., Impact of photo periodic information on pineal metabolism and physiology, International Journal of Biometeorology 1985;29: 2:178-187.

[10]. Sarkar S., Sarkar NK., Das P., Maiti BR., Photo thermal effects on ovarian growth and function in the soft-shelled turtle lissemys punctata punctata, Journal of Experimental Zoology1996;1; 274:1:41-55.

[11]. Simoneau C., Estrada R., Maton P., Roy PE., Dufour JJ., Effects of litter size and light regimen imposed during lactation on ovarian follicular population at weaning in third parity sows, Journal of Animal Science 1988;66:10:2606-13.

[12]. Thomas BB., Oommen MM., Effect of photic changes and olfactory impairment on reproduction in female south Indian gerbil, Indian Journal of Experimental Biology 1999;37:12:1201-4.

[13]. Vitaterna MH., Takahashi JS., Turek FW., Overview of circadian rhythms Alcohol, Resurrection Health Care 2001;25:2:85-93.

[14]. Weibel: Stereological methods, Theoretical foundations, London Academic press, Vol.12,1985.

[15]. Zisapel N., Barnea E., Anis Y., Izhaki I., Reiter RJ., Halim A., Involvement of pineal gland in daily scheduling of the golden spiny mouse, Life Sciences 1998;63:9:751-7.

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