

**HORMONAL STUDY DURING OVARIAN CYCLE IN THE EMBALLONURIDAE FEMALE BAT  
*TAPHOZOUS KACHHENSIS* (DOBSON)**

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**Abstract:** The ovarian hormone examined during different stages of reproductive cycle in bat *Taphozous kachhensis* are describe. During estrus there is sharp increase in estrogen level is observed, while the progesterone level is decrease. This sharp increase in the level of estrogen correlates with histological observation during estrus where ovary shows well developed Graffian follicles. During the early pregnancy the concentration of progesterone is increases, while estrogen concentration decreases, this observation correlates with the histological finding of corpus luteum during early pregnancy. As the pregnancy advanced there is further decline in the level of progesterone during mid pregnancy but it is high as compare to estrogen, this decrease in the level of progesterone is due to the regression of corpus luteum during mid pregnancy. The higher level of progesterone is further maintained after the formation of placenta. During the late pregnancy there is sharp increase in the level of estrogen, while the progesterone level again decreases. During lactation sharp increase in the level of estrogen is observed, while the level of progesterone is decreases and attains the low concentration.

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**Key words:** Ovary, estrogen, progesterone, pregnancy.

## INTRODUCTION

The peripheral concentration of a hormone reflects the balance between rates of secretion and metabolic clearance, with the latter influenced by the extent to which the hormone is bound by plasma proteins.

In female bats, the major circulating ovarian hormones are oestradiol, progesterone. The two principal sources of steroid hormones are the ovary (interstitial tissue, thecal cells, granulosa and luteal cells) and placenta. While the steroidogenic activity of the mammalian ovary has been and remains an active field of research, very few studies have examined ovarian steroidogenesis bats. This is in spite of the fact that the structure of the ovary of several species poses interesting questions about ovarian steroidogenesis.

The two major sources for progesterone in bats are the corpus luteum and the placenta with the relative importance of these two organs differing both temporally within a species and between species. Additional sources of progesterone are the ovarian interstitial tissue and the adrenal gland. The most complete data are available for *Myotis lucifugus* and *Miniopterus schreibersii* and clearly illustrate these points. In both species the placenta takes over progesterone production from the corpus luteum in the final third of pregnancy (Buchanan and Younglai, 1988 and van Aarde *et al.*, 1994

respectively). Less complete data, indicating that the placenta takes over progesterone production from the corpus luteum are available for many other species. For example, the corpus luteum of a range of species undergoes luteolysis in late pregnancy (e.g. Kayanja and Mutere, 1975, *Otomops martiensseni*; Kitchener and Halse, 1978, *Chalinolobus gouldi* and *Eptesicus regulus*; Kitchener and Coster, 1981, *Chalinolobus morio*; Gopalakrishna, 1969, Gopalakrishna *et al.*, 1986, *Rousettus leschenaulti*; Towers and Martin, 1995).

## MATERIALS AND METHODS

*Taphozous kachhensis* (Dobson) is an exclusive Indian Emballonuridae bat found in caves, tunnels and temples. The bat selected for present study because of unique habits. The gestation length of adult female of the species *Taphozous kachhensis* (Dobson) is about 100 days. The collection of the specimen commenced in February 2006 and the last specimen for the present study was collected in May 2009. The specimen of *Taphozous kachhensis* were collected from Ambai Nimbi, 45 kilometers from Bramhapuri (M.S.). Many collections were made during the breeding season so as to coincide with the time of reproductive cycle and to get an accurate pregnancy record. During day time their roosting places were visited and the specimens were netted at random with the help of a butterfly net. These bats are very

sluggish in nature after collection they were sexed and only the females were brought to the laboratory. Weight recorded with sensitive spring balance before they were sacrificed. After noting the weight the blood is collected from the heart or from the wing vein with the help of disposable syringe for hormonal assay.

The plasma concentration was measured by Radioimmunoassay by using RIAK-5 kit. This method involved the binding between specific antigen and the antibody. The different hormone like progesterone and estrogen, were measured by using assay kit. The

method is worked out in biochemical laboratory, Health care immunoassay division, Nagpur.

## RESULTS

### Hormonal profile during ovarian cycle

The ovarian hormone examined during different stages of reproductive cycle in bat *Taphozous kachhensis* are describe below.

**Table-2:-Hormonal concentration during reproductive cycle**

Reproductive Period	Concentration of Estrogen pg/ml	Concentration of Progesterone ng/ml
	Estrogen	Progesterone
Anestrus	7.9	6.2
Estrus	39.23	4.7
Early pregnancy	16.73	24.67
Mid-pregnancy	5.49	9.87
Late-pregnancy	13.60	3.2
Lactation	31.24	1.24

During Anestrus period the estrogen concentration is found 7.9pg/ml, while the progesterone is 6.2 ng/ml. During estrus there is sharp increase in estrogen level is observed (39.23pg/ml), while the progesterone level decreases to 4.7 ng/ml. This sharp increase in the level of estrogen correlates with histological observation during estrus where ovary shows well developed Graffian follicles. During the early pregnancy, the concentration of progesterone is increased to 24.67ng/ml., while estrogen concentration decreases to 16.73 pg/ml; this observation correlates with the histological finding of corpus luteum during early pregnancy.

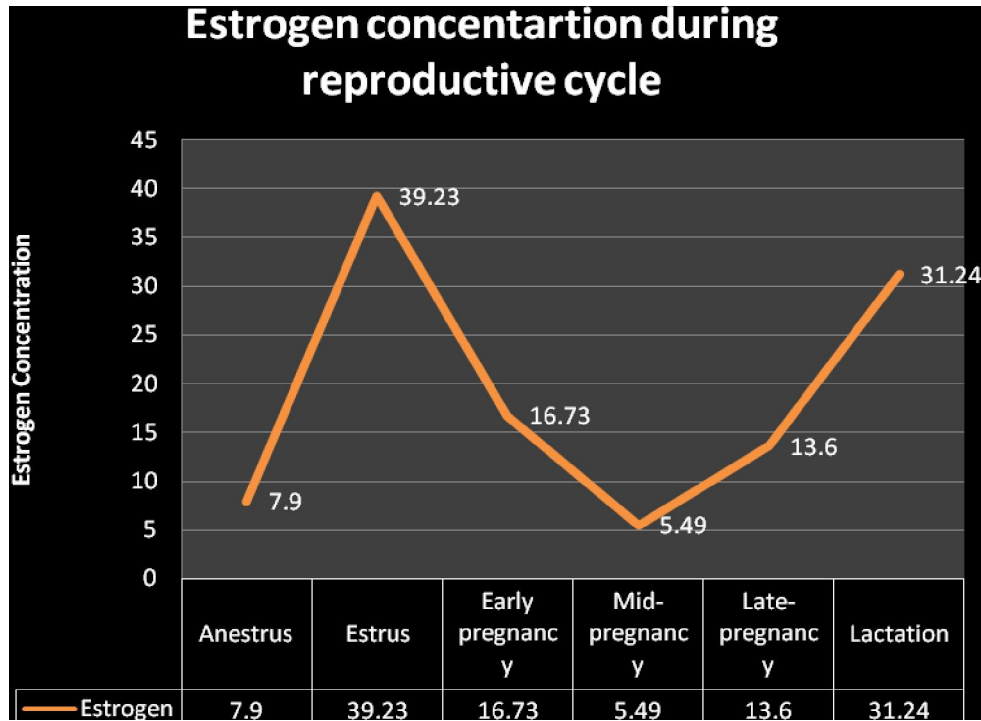
As the pregnancy advances further there is further decline in the level of progesterone (9.87 ng/ml); during mid pregnancy but it is high as compared to estrogen (5.49 pg/ml) this decrease in the level of progesterone is due to the regression of corpus luteum during mid pregnancy. But the higher level of progesterone is maintained due to the formation of placenta. During the late pregnancy sharp increase in the level of estrogen is noticed (13.60 pg/ml) while the progesterone level again decrease to (3.2 ng/ml). During lactation there is a sharp increase in the level of estrogen (31.24 pg/ml) is observed. While the level of progesterone is decreased to (1.24ng/ml).

## DISCUSSION

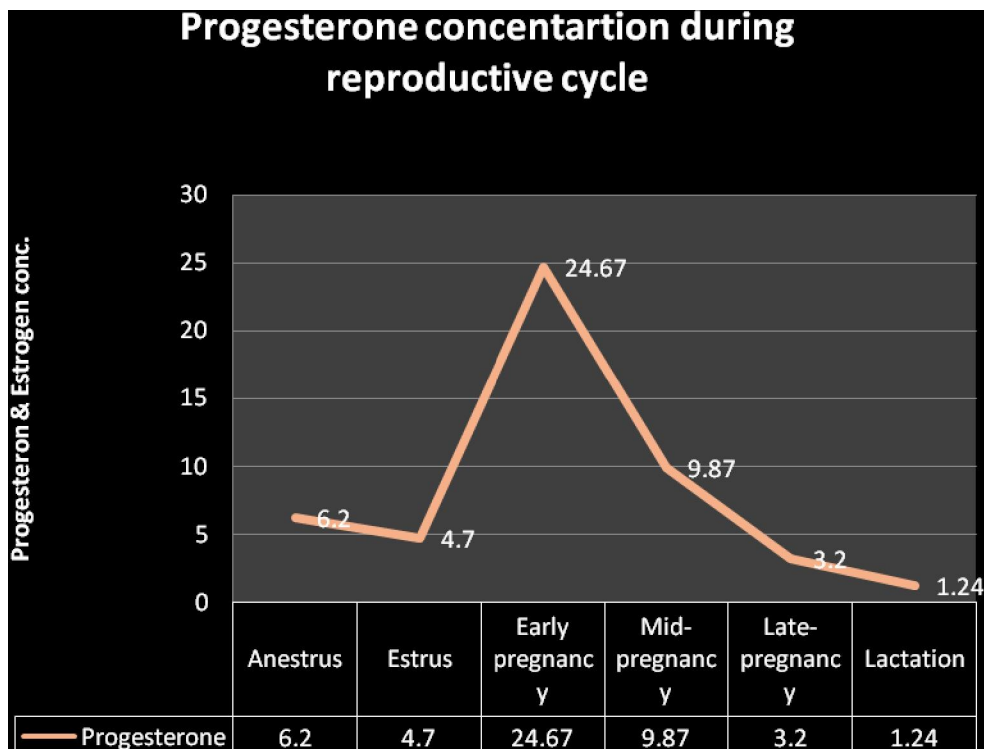
In the female bat, the pattern and levels of increases in progesterone concentration and its decline after the luteal phase is similar to that found in other species of bats. The progesterone concentration remains at basal levels throughout the estrus, as observed by others (Sonwane D.D.2010; Khadiga et.al, 2005).

The cyclic pattern of progesterone concentration in bat plasma found in this study is in agreement with known changes in cl function in the bat that occur during the estrous cycle. The rapid decline of progesterone in the peripheral plasma of the bat towards the end of the cycle as well as the marked rise in concentration during the time of cl development is strong evidence for suggesting cl function can be monitored in peripheral plasma by progesterone determination. That the plasma progesterone levels would decrease rapidly with declining cl function is suggested by other researcher (Sonwane D.D.2010., Imori 1967).

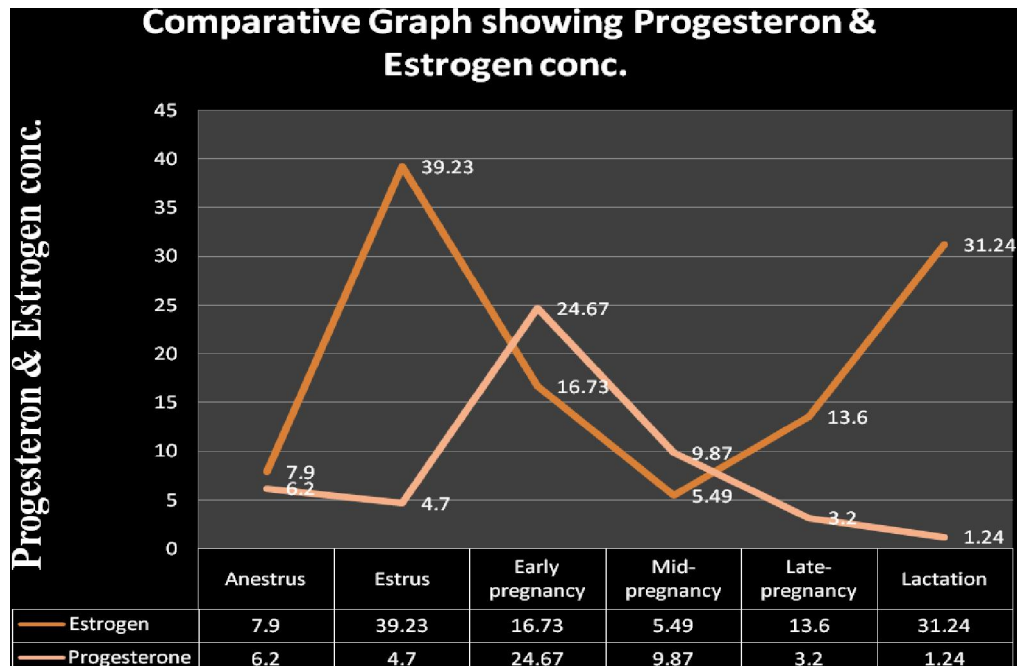
Musaddin *et al.* (1996) reported mean progesterone concentration during the follicular phase of estrous cycle as 0.19 and 0.26 ng/ml in DorsetHorn-Malin (DHM) and Malin ewes, respectively.



Graph 1:- Estrogen concentration during various phases of reproductive cycle.



Graph 2:- Progesterone concentration during various phases of reproductive cycle.



**Graph 3:-Comparative Graph showing Progesterone & Estrogen conc.**



**Fig 1.** Transverse section of ovary during anestrus showing primordial follicle at peripheral part of ovary while deeper part of ovary shows the presence of multilaminar follicle (100X)

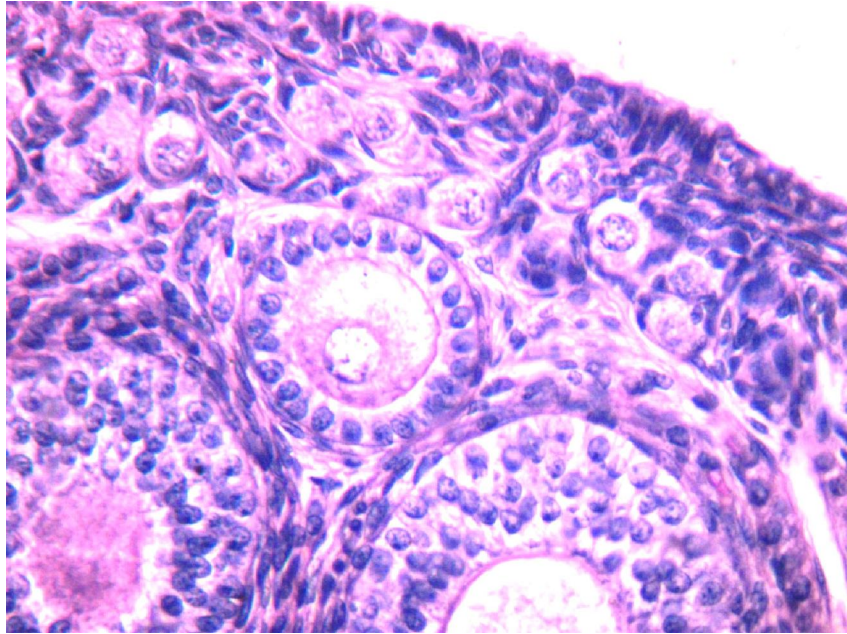


Fig 2. A part of ovary enlarged to show primordial follicle at the peripheral part of ovary. The cortex shows the presence of multilaminar and unilaminar follicle (400X);

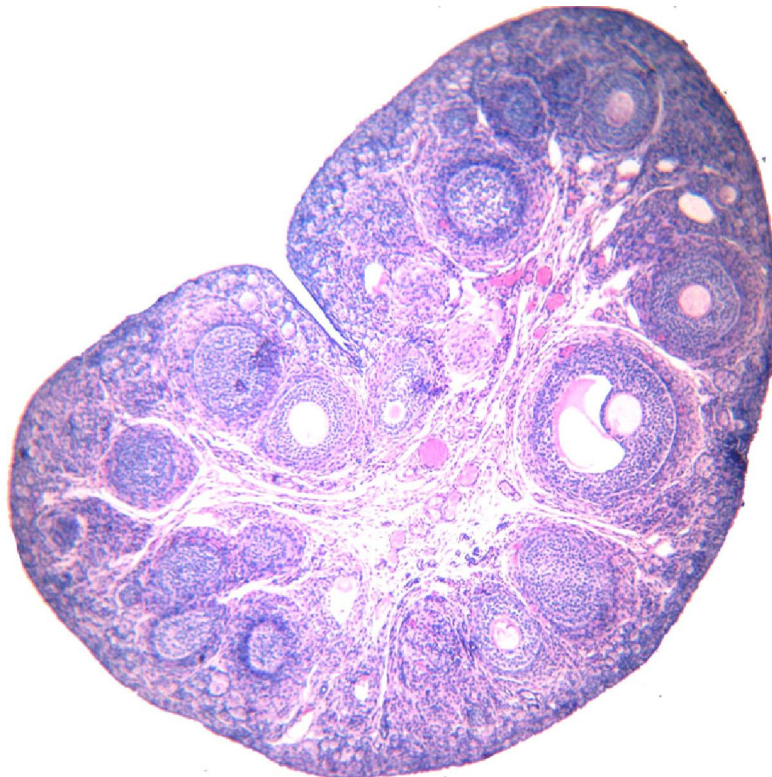
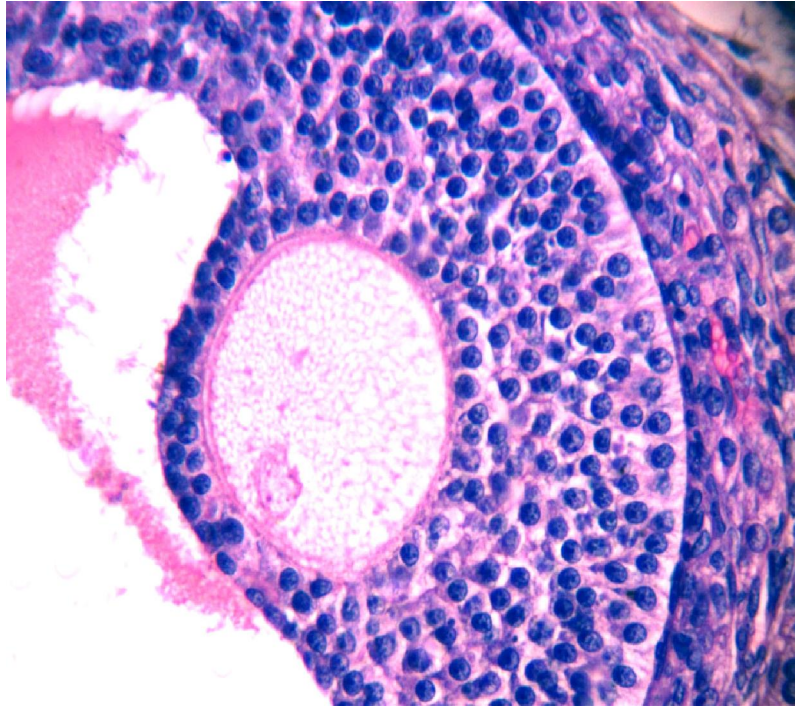
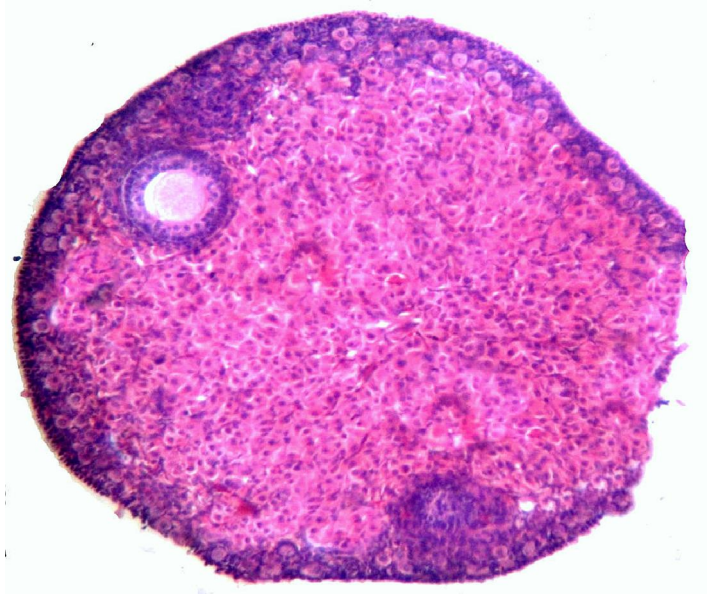


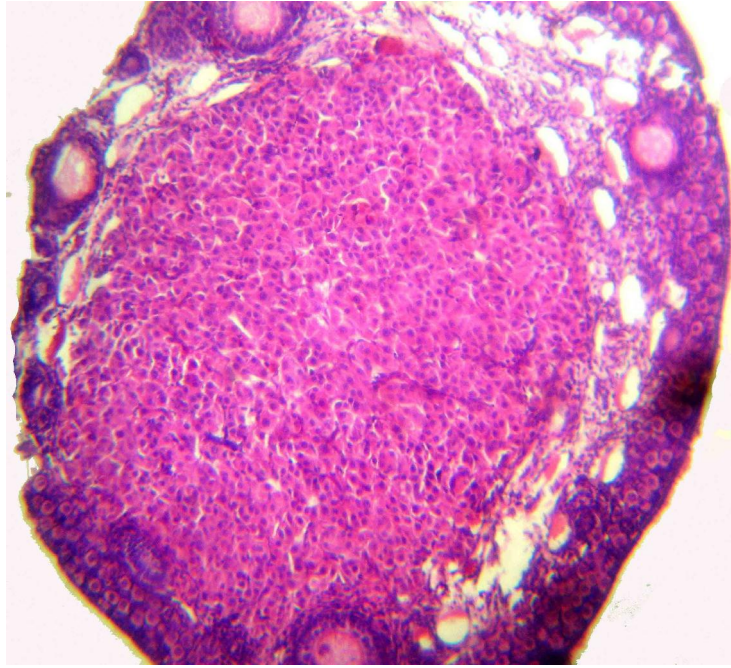
Fig 3. Transverse section of right ovary during estrus showing the presence of primordial follicle (PF), multilaminar follicle and Graafian follicle (GF). Note the antrum (A) filled with liquor folliculi (100X)



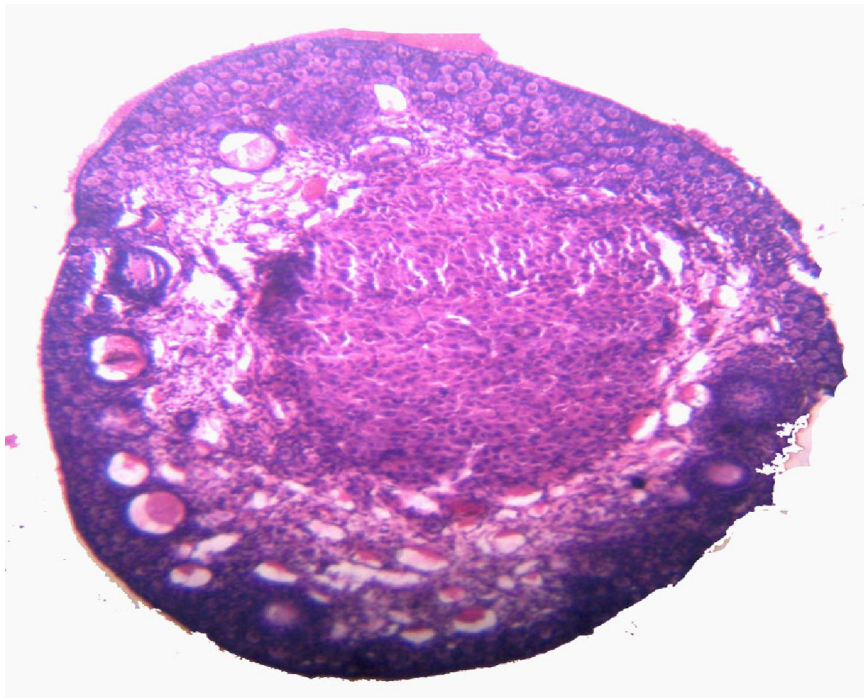
**Fig4.** A part of ovary during the estrus showing a large graffian follicle at peripheral part of ovary. The antral cavity occupies large part of follicle due to which oocytes pushed to one side (400X)



**Fig5.** Transverse section of ovary during early pregnancy showing the presence of introvert corpus luteum (100X)



**Fig6.** Transverse section of ovary during mid-pregnancy showing the presence of regressed corpus luteum, few primordial follicles, and one double layered follicle (100X)



**Fig7.** Transverse section of ovary during late-pregnancy showing the presence of regressed corpus luteum

During the luteal phase, the concentrations were 2.33 and 2.94 ng/ml, respectively. But in female bat *Taphozous kachhensis* the mean estrogen and progesterone concentration during the follicular phase of estrus cycle were 39.23 pg/ml and 4.7 ng/ml respectively. In Damascus goats, the progesterone level during luteal phase ranged from 2.6 to 5.4 ng/ml (Khadiga *et al.*, 2005), which is comparable to the levels in *Taphozous kachhensis* during mid pregnancy.

Blaszczyk *et al.* (2004) reported the estradiol levels in Anglo-Nubian does at the time of estrus as  $15.3 \pm 5.0$  and  $12.2 \pm 3.8$  pg/ml in and outside the breeding season, respectively. While the estradiol level in *Taphozous kachhensis* dose at the time of estrus as 39.23 pg/ml and 16.73 pg/ml in outside the breeding season, respectively.

In *Taphozous kachhensis* during the gestation the higher level of progesterone were maintained with the wide variations. In this bat the mean plasma progesterone and estrogen concentration ranged from 6.2 ng/ml to 9.87 ng/ml and 7.9 pg/ml to 5.49 pg/ml from anestrus to mid pregnancy. The overall increase in progesterone levels during gestation and a decline towards the parturition and parturition, observed in the *Taphozous kachhensis* and also resembles with the *Megaderma lyra lyra* (Sonwane D.D. 2010), Dwarf goat (Khanum *et al.*, 2008).

Prepartum decline in the progesterone levels was correlated with the onset of parturition (Laura *et al.*, 2004).

## CONCLUSION

We conclude that estrogen is essential for normal folliculogenesis beyond the antral stage.

Estrogen is the first significant hormone of the estrous cycle. Rising estrogen levels result in the clinical signs of estrus. Progesterone produce by the corpus luteum prepare the uterus for the entry of the fertilized egg and quite the uterus to maintain the pregnancy.

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