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STUDY OF HISTOLOLOGICAL STRUCTURE OF OVARY OF NORMAL FEMALE RAT, *RATTUS RATTUS* WITH REFERENCE TO SEASON

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ABSTRACT:

Present study reveals seasonal variation in histological structure of ovary of normal female rat, *Rattus rattus*. Rodents exhibit a variety of reproductive patterns. Some shows continuous reproductive activity whiles other show cyclical periodicity. The seasonal variation affects reproductive activity in rodents. Rodents being the largest order of mammals its adaptive radiation can be observed with regards to their breeding habits, duration of pregnancy and structural changes in reproductive organs during different phases of reproductive cycle.

Animal reproductive activity of rat, *Rattus rattus* where divided according to season - rainy season (June to September), winter season (October to January) and summer season (February to May). The world's climate is changing rapidly now and there is concern that many species may face extinction if they cannot evolve new strategies. Histomorphological seasonal variation in the structure of ovary reveals physiological changes resulting in the size of ovary, number of growing follicles and corpora lutea. Atretic follicles were also present in the ovary. An attempt has been made to correlate the histological changes in ovary with environment factors such as day length, temperature, rainfall and availability of food.In the present paper seasonal variation in the histomorphological changes in ovary had been studied.

Keywords: rodents, follicles, atretic follicle and *Rattus rattus.*

INTRODUCTION:

Rodents are small, herbivorous, plantigrade, body covered with fine fur which may be modified into spines. They have been studied extensively in recent years due to its geographical distribution and cyclic abundance shown by most of the species (Mullick 1959, Mann and Bindra, 1977). The climate changes adapt rather easily small rodents of the world (Forchhammer, 2008) than other mammals. Seasonal changes in reproductive productivity, growth rate and food intake in mice expose to different region of day length and environmental temperature was studied.(Pennywick, 1972 and Sadlier, 1969).The world's climate is changing rapidly now and there is a concern that many species may face extinction, if they cannot evolve new seasonal strategies.(Bradshaw and Holzapfel, 2006).However, literature on seasonal fluctuations of temperature and climatic condition on the normal female rat reproductive organs is scanty.(Davis and Hall , 1940,1951).The attention of this study was to reveal any significant variation amongst histomorphology of ovary of rat*, Rattus rattus* which can be attributed to seasonal cycles. In spite of the fact that rat, *Rattus rattus* is a permanent polyestrous and continuous breeder, Singh (1985) observed two peaks of fecundity in rat, *Rattus rattus* and no pregnant female was trapped during summer in his studies.

Several investigators have studied the ovarian histological changes (Marshall, 1922 and Hett, 1933) have described the morphology of Corpus luteum. The cyclical production and development of follicles have been reported by Swezy and Evans (1930),Brambell (1935), and Rowland (1956).The quantitative study of relation between ovum growth and follicular growth have been presented by Brambell (1928, 1935)

MATERIALS AND METHODS:

Monthly collection of rats *Rattus rattu*s were made from June 2005 to December 2008 throughout the year. The rats were brought to the laboratory alive. The males and females were separated by observing scrotum and mammary glands. The animalwere anaesthetized with petroleum ether. Ovary was dissected out and sectioned into pieces. For histological examination, ovary

was fixed in alcoholic bouin's fluid. The tissue was dehydrated through graded series of alcohol, cleared in xylene, embedded in paraffin wax and sectioned at 5 to 6 μ thickness. The sections were stained with hematoxylin and counter stained with Eosin for microscopic observation.

OVARIAN HISTOLOGICAL CHANGES :

Histologically, the ovary is distinguished into cortical and medullary region. The cortex is far more compact than the medulla. Further the tunica albuginea although not well developed can still be identified. In anoestrus ovary, the germinal epithelium shows cuboidal cells here and there. The cuboidal cells further form oocytes and follicles. These oocytes and follicles migrate towards the the deeper region of the ovary and very often multilayer follicles are produced. Invariably all the follicles undergo degeneration and atresia might occur at any stage. Obviously the activity of the germinal epithelium is controlled by internal endocrine factors. (Duke,1949 and 1966 and Kingsbury, 1914).

OBSERVATION:

In present study, histological examination of the ovary during rainy season was found to be large and the stroma was occupied by many Graafian follicles pushing them towards cortical region with few non - functioning Corpus lutein. The luteal cells undergo degeneration. .Atretic follicles where also present.(Fig : a)

During winter season, the ovary contain large number of corpora lutea containing active lutein cells along with few ovarian follicle. (Fig: b) while in the summer season, more degenerating corpora lutea was observed within degenerating lutein cells. Few growing follicles too are observed. Atretic follicle where present in the stroma of the ovary.(Fig:c)

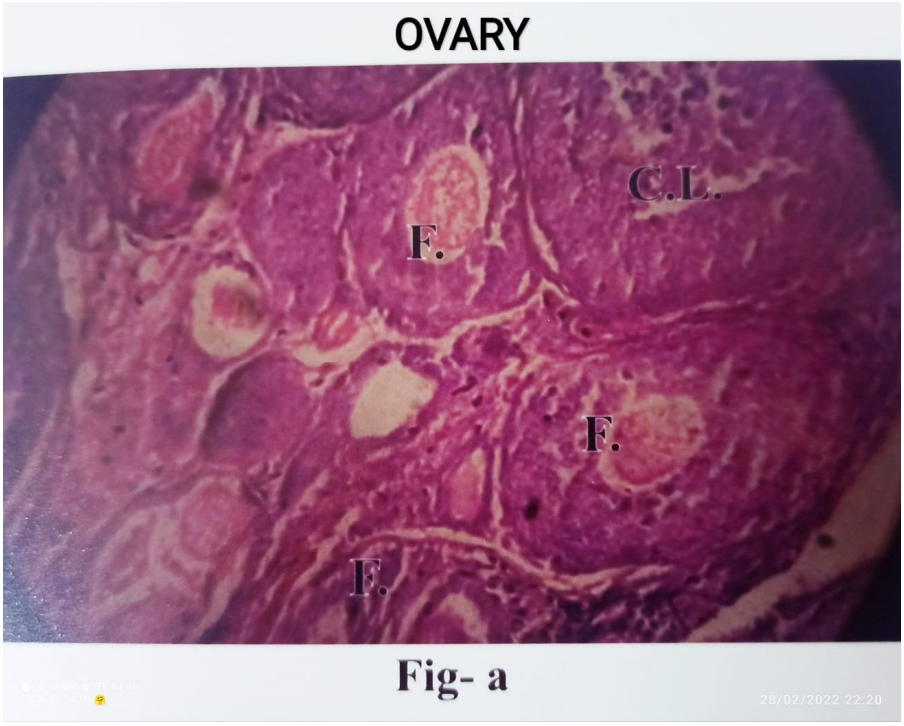

Fig. a: Transverse section of ovary magnified view in rainy season. Note numerous growing follicles along with degenerating follicles, Corpus Luteum (C.L.) and Atretic Follicles (A.F.).X 400.

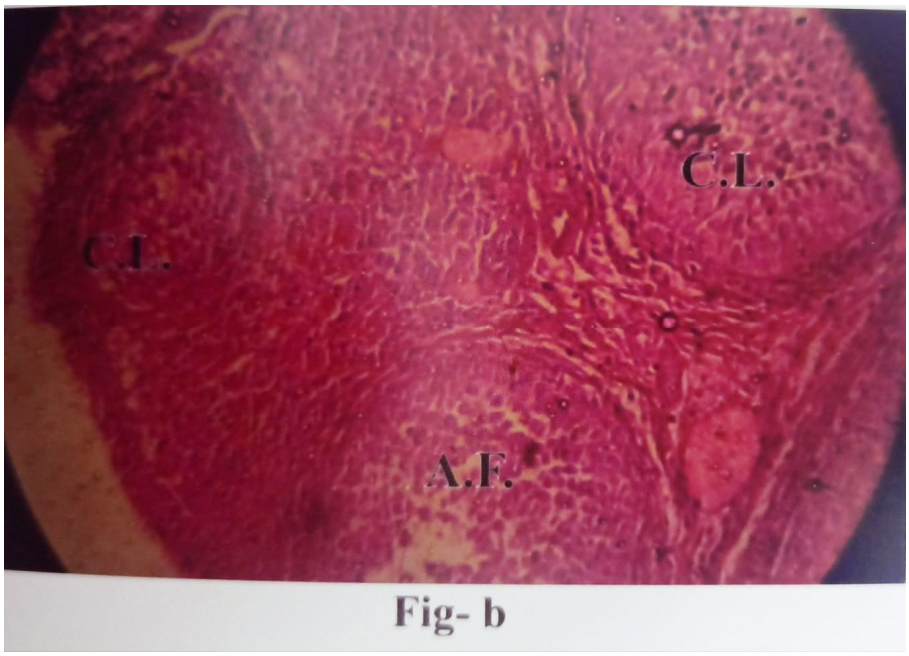

Fig. b: Transverse section of ovary during winter season, magnified view showing two functional Corpora Lutea along with single degenerating Corpus Luteum(C.L.) and growing follicles in the stoma. X 400.

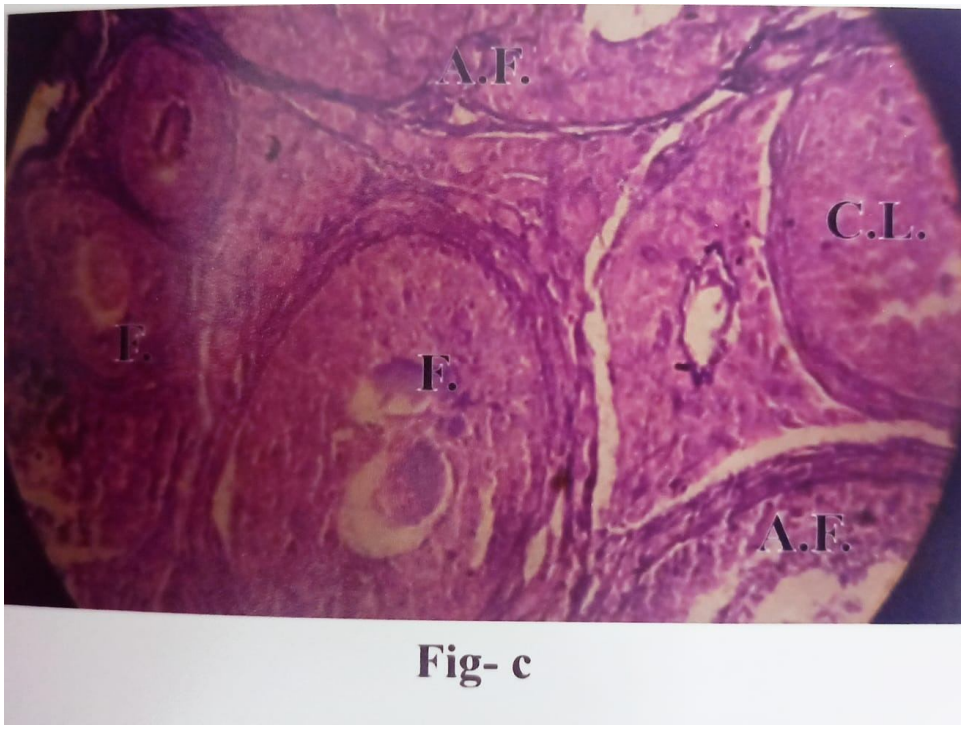

Fig. c: Transverse section of magnified view of ovary, in summer season showing large no. of growing follicles (F.) along with functional and degenerating Corpus Luteum (C.L.) and Atretic Follicles (A.F.).X 400.

CONCLUSION:

The reproductive organs of some mammals are often affected by change in day length associated with changes of seasons (Wallen and Schneider, 2000). Photoperiod for food availability and temperature influence reproductive cycles of mammals. (Zuker et.al.1980). Mullick (1959) in the rat reported decline reproductive performances of female during summer month. In the present study, the histological appearance of ovary was found to be large in size and stroma showed fluctuation in number of follicles and corpora lutea. This shows that, the histological appearance of ovary was not much affected by seasonal changes. However, during winter season large number of follicles in ovary indicates that though rat is continuous breeder the fecundity was high during the winter season and can be related to the onset of lower ambient temperature.

The breeding activity of seasonal breeders is reported to be largely dependent on some of the environmental factors viz: day length, temperature, relative humidity, rainfall and availability of food. (Lincoln, 1980, Bartness and Wade, 1985). The annual changes in day length however is the principal environmental

cue controlling the timing of reproduction for many non - tropical mammals. The world's climate is changing rapidly now and many species may face extinction if they cannot evolve new seasonal strategies. (Bradshaw and Holzapfel, 2006)

The correlation of relative humidity rainfall and breeding activity is insignificant and it does not appear to have any regulatory effect on breeding behaviour and on histological structure of ovary in rat, *Rattus rattus.*

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