



SEASONAL VARIATION IN HISTOLOGICAL STRUCTURE OF VAGINA OF NORMAL FEMALE RAT, *RATTUS RATTUS*

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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 while 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 vagina, indicates that no mark changes occurred during rainy, winter and summer season. The muscles are well developed and thick while lumen lined by vaginal epithelium consist of many layers of cells. In summer season, the vaginal lumen found to contained folds whereas no such infoldings of vaginal epithelium was observed during rainy and winter season. An attempt has been made to correlate the histological changes in vagina with environment factors such as day length, temperature, rainfall and availability of food .In the present paper seasonal variation in the histomorphological changes in vagina had been studied.

Keywords: *rodents, histomorphological, vaginal epithelium 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 Vagina 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 vaginal histological changes. Obermuller (1900) reported connective tissue changes in vaginal wall which are associated with pregnancy and age. Runge (1924) verified the observation of connective tissue enlargement and mentioned epithelial proliferation in human vagina. Stieve (1925) made the most complete study of human vaginal histology. Clouberg (1931) compared changes in the vagina epithelium only of the pregnant with non-pregnant mouse. It has been well established that functioning of female reproductive system is governed by ovarian changes. (Eckstein and Zukermann,1956).This changes occurring under hormonal influences in the ovary are reflected in the characteristic cell type of the vagina. The correlation between ovarian function and vagina cellular picture was first made by Stockard and Papanicolaou (1917) in guinea pig. The vagina mucopolysaccharides were mostly studied in bovine, rodents and human beings. Morau, (1988) first reported mucus in the vagina epithelium of rat. Longs and Evans, 1922 describe mucus cells in the late pregnancy a fat vagina as being high superficial and present in several layers. Tribby (1943) observe cyclical changes of glycogen, mucus and lipids in the vaginal epithelium of guinea pig. Lapanand Friedmann (1950) reported that in the viscous liquid of human vagina, glucose and glycogen was present and the quantity increases during pregnancy and decrease after parturition, Peryt and Szumowska (1968) studied the vagina epithelium of voles and guinea pigs during pregnancy.

MATERIALS AND METHODS:

Monthly collection of rats *Rattus rattus* were made from June 2005 to December 2008 in Amravati District (latitude 20° 56' and 77° 48'E) Maharashtra state India, throughout the year. Regular collections off every season were made throughout the year (summer rainy and winter season) for completion of this research work. The rats were brought to the laboratory alive. The males and females were separated by observing scrotum and mammary glands. The animals were anaesthetized with petroleum ether. Ovary was dissected out and sectioned into pieces. For histological examination, ovary was fixed in alcoholic Bouin's fluid. The tissues were washed in 70% alcohol several times to remove the picric acid. The tissue was dehydrated through graded series of alcohol, cleared in xylene, embedded in paraffin wax and sectioned at 7µ thickness for histological observation. The sections were stained with Ehrlich's Hematoxylin and counter stained with Eosin for microscopic observation.

SEASONAL HISTOLOGICAL CHANGES IN VAGINA:

The female reproductive system of rat, *Rattusrattus* consist of a pair of ovary, a pair of fallopian tube, a pair of bicarbonate uterus and a median vagina. The organs are situated in the pelvic region of the abdominal cavity. The vagina is a short muscular canal lying mid-ventrally that leads from the female rat's uterus to the outside of the body. The vagina serves as a birth canal and also as an orifice for the acceptance of sperm during mating.

In transverse section of vagina during summer season, shows extensive epithelial infoldings with multilayered cuboidal cells with wide lumen and prominent connective tissue (Fig:a.). During winter season, transverse section of vagina shows well developed squamous epithelium, connective tissue and muscle coat with wide lumen.(Fig:b.). During rainy season transverse section of vagina show magnified view of stratified squamous epithelium and cellular debris in lumen. The connective tissue and muscle layer shows extensive development. (Fig:c) The lumen is irregular due to occurrence of folds. In anestrus, the vagina is thick, muscular dense connective tissue and epithelium consists of two to three layers of stratified cells. With the onset of breeding season, the lumen of vagina becomes enlarged and there is increase in the number of folds and blood vessels in the mucosa.

OBSERVATION:

In the present study the histological structure of the vagina observed, indicates that no mark changes occurred during rainy, winter and summer season. (Fig: a, b & c). The muscles are well developed and thick while lumen lined by vaginal epithelium consist of many layers of cells. In summer season,

the vaginal lumen found to contained folds whereas no such infoldings of vaginal epithelium was observed during rainy and winter season. (Fig: a, b & c).

Figure showing Seasonal Histological Changes in Vagina

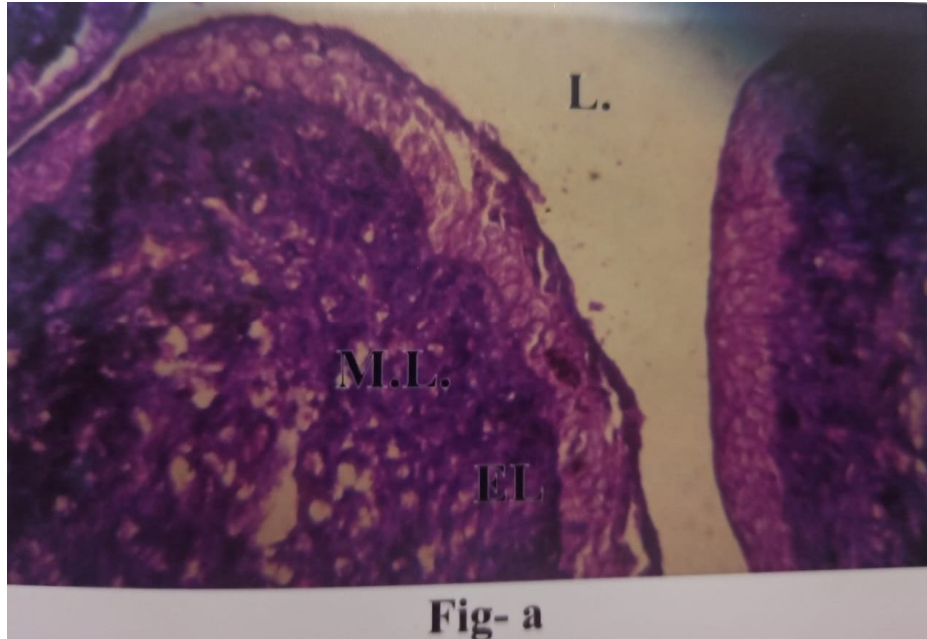


Fig. a: Photomicrograph of transverse section of vagina showing extensive epithelial (E.L.) infoldings with multilayered cuboidal cells with wide lumen (L.) and prominent development of connective tissue during summer season, X 400

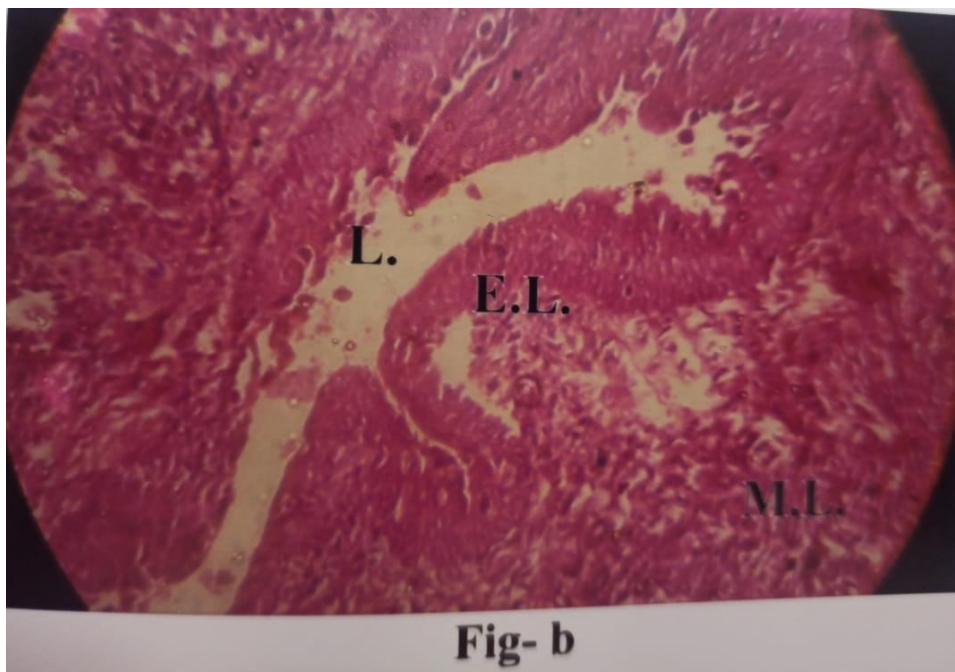


Fig. b: Section of vagina magnified view showing well developed squamous epithelial, (E.L.) connective tissue and muscle coat with wide lumen (L.) during winter season. X 400.

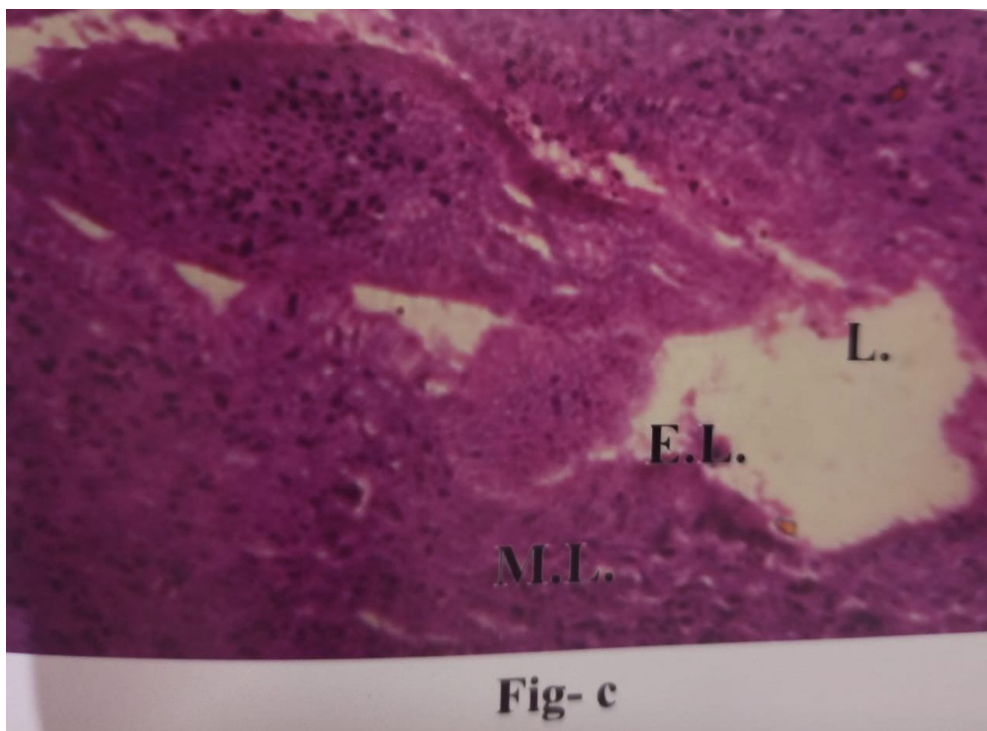


Fig. c: Transverse section of vagina, magnified view. Note the stratified squamous epithelium(E.L.) and cellular debris in lumen(L.). The connective tissue and muscle layer (M.L.) shows extensive development during rainy season. X 400

CONCLUSION:

The reproductive organ 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 structure of the vagina observed, indicates that no mark changes occurred during rainy, winter and summer season. (Fig: a, b & c). The muscles are well developed and thick while lumen lined by vaginal epithelium consist of many layers of cells. In summer season, the vaginal lumen found to contained folds whereas no such infoldings of vaginal epithelium was observed during rainy and winter season. This indicates that vaginabeing a short muscular canal lying mid-ventrally to the outside of the body does not show any significant seasonal histological changes in normal female rat, *Rattus rattus*. 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 vagina in rat, *Rattus rattus*.

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