

**Research Article****Effect of swimming stress on the estrous cycle in adult female albino rats**Girija Sivakumar<sup>1\*</sup>, K. Kamaksh<sup>2</sup><sup>1</sup>Department of Anatomy, Karpaga Vinayaga Institute of Medical Sciences, Maduranthagam<sup>2</sup>Department of Anatomy, DR. ALMPG Institute of Basic Medical Sciences, Chennai**ARTICLE INFO:****Article history:**

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**ABSTRACT**

Oestrous cycle is altered when subjected to swimming stress. Adult female albino rats were subjected to swimming stress for an experimental period. Animals were treated with a polyherbal drug after subjected to swimming stress. Another group of animals were left without any alternate treatment till the end of the experimental period. Vaginal swab and taken and smeared to study various stages of estrous cycle in all the four groups. Smeared slides were stained with toluidine blue for study of instant vaginal cytology and permanent staining was done by routine Haematoxylin and Eosin stain for morphometric studies. Results obtained were compared between various groups.

**1. Introduction**

Rats are polyestrous species that they have repeated reproductive cycles in a year. Human females also polyestrous that they monthly reproductive cycle. Any factor applied either externally or internally will produce changes in their reproductive cycle. Due to various factors the reproductive cycle gets disturbed. To regularize the disturbed cycle, women undergo various treatments which includes chemical drug, natural medicines, herbal drugs, siddha medicines etc. The present research work has been carried out to study the stress related changes in the estrous cycle in adult female albino rats and swimming was selected as physical stress. Repeated vaginal cytology study was carried out by taking vaginal smear study. Various stages of estrous cycle was studied in different groups of animals and compared and tabulated.

**2. Materials & Methods**

Adult female albino rats weighing about 110-120gms were selected for the study (CPCSEA Approval No.01/002/2000, No.01/010/2003). Animals were divided into four groups (**Table.1**). Group I animals were maintained as control group with normal feed and ad. libitum throughout the experimental period. Group II animals were subjected to swimming stress for 30 minutes every day for 30 days[3].

Group III animals were treated with a polyherbal drug after the experimental period of swimming stress. The polyherbal drug was a combination of extract derived from various herbal plants (Amruthanjan, Ltd, Chennai). It contains crocus sativus, cinnamomum camphora, Abroma augusta, Vitis quadrangularis, Saraca indica[4-6]. The polyherbal drug was tested and certified for its components and absence of steroid by Department of Pharmacology, University of Madras. Group IV animals were subjected to swimming stress and then left without any drug treatment and feed with ad.libitum as like Group I control animals. Animals of all the groups were subjected to vaginal cytology smear study. Vaginal smear was taken using a small cotton probe which was inserted into the vagina after sterilizing the vaginal region. Vaginal mucus was then smeared on a clean slide and immediately stained with toluidine blue for cytological study[1].

**3. Observations**

Control group of animals found to exist in four different stages of estrous cycle – Proestrous, Estrous, Metestrous and Diestrous lasting for specified hours[7] as specified in the Table 2. Of this Estrous stage is said to be the ovulatory stage

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during which the female rats shows acceptance to males and Diestrous stage is said to be the resting stage during which the cells of vaginal cytology shows small leucocytes[2]. Group II animals show a prolonged diestrous stage[3] which indicates the stress induced by prolonged swimming. Group III animals show a recovery to normal condition which was proved by the

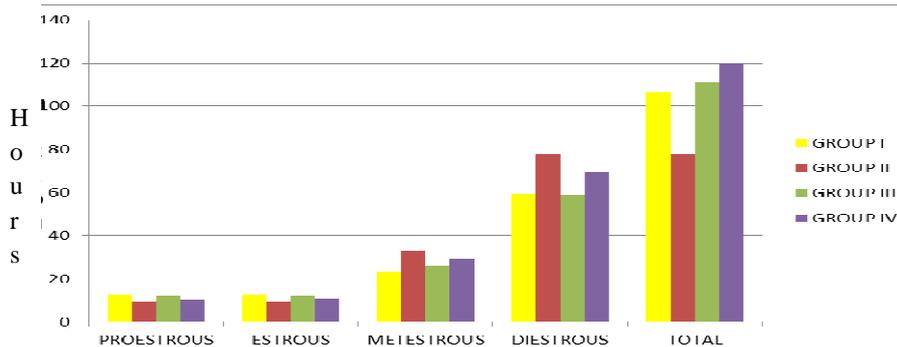
presence of estrous stage. Group IV animals after the withdrawal of swimming stress, even though showed various stages, the duration of each stage did not correlate with the normal group. The duration of various stages of estrous cycle were measured and tabulated and represented by bar diagram (Fig.1).

**Table 1:** Grouping of animals

Group	Duration
I Control	30 days
II Subjected to swimming stress	30 days
III Treated with polyherbal drug after swimming stress	30 days
IV Withdrawal of swimming stress	30 days

**Table 2:** Variation in the stages of estrous cycle

Groups	Proestrous	Estrous	Metestrous	Diestrous	Total duration
(Duration in Hours)					
I	12.8±0.3	12.8±0.3	23.1 ± 0.5	57.6 ± 0.7	106.3 ± 0.8
II	9.2 ±0.2	9.5 ± 0.4	33.0 ± 0.4	87.6 ± 0.8	139.3 ± 0.4
III	12.3 ± 0.3	12.1 ± 0.3	26.0 ± 0.2	59.1 ± 0.8	108.0 ± 0.9
IV	10.2 ± 0.3	10.5 ± 0.2	29.3 ± 0.4	67.3 ± 0.7	117.0 ± 0.8



**Figure 1:**

#### 4. Discussion

In the swimming stress induced animals, there was a delayed diestrous stage, due to which there was shortening in other stages of the estrous cycle. Total duration of the estrous cycle also got changed which is in agreement with the observations made by Rama Prasad, 1986. The vaginal cytology showed only the presence of leukocytes for a prolonged period and in other stages also, along with the cell type of the particular stage, leukocytes were also present more in number.

#### 5. Results

Control group of animals show regular estrous cycle with four stages – Proestrous, Estrous, Metestrous and Diestrous[2,4]. Of these four stages estrous stage is the reproductive stage in which the animals are highly fertile to produce young ones.

Cells undergo cornification and squamatization. Vaginal fluid appears very clear and watery. At this stage female albino rats are highly receptive to male's albino rats for mating. Diestrous stage is the resting stage where the animals remain in dormitory stage. It is the longest period which lasts for about 53-59 hrs. This stage is said to be non-reproductive stage. Vaginal smear appears to be milkish in color and highly viscous in nature. Only leukocytes will appear in the smear which is specific for this stage. Group II animals remained in a prolonged diestrous period which was confirmed by the diestrous stage. There was a persistent presence of leukocytes in the vaginal smear. It lasted for about 80-85 hrs. Weight and volume found to be reduced in Group II animals. Ovary shrunken in size. Both Group III & IV did not differ much from control group. Variation in the stages of estrous cycle has been shown in Table II.

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