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## Pineal gland and body weight relationship in the Indian palm squirrel, *Funambulus pennanti*

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**Abstract :** Relationship between changes in pineal gland weight and body weight of Indian palm squirrel, *Funambulus pennanti* were studied during April-August. High body weights were recorded between April – June .Body weight started decreasing from July onwards and was lowest in August. A decreasing trend in pineal weight was noted between April- June .Pineal gland weight was observed to be lowest in the month of June after which it started increasing and became maximum in August .A significant variation was observed in the body weight and pineal gland weight during the different months of the study( $p < 0.001$ ).A statistically significant negative correlation was noted between the pineal gland weight and body weight of the animal ( $p < 0.001$ ).

**Key words:** Body weight, Pineal, Mammal, Correlation, variation.

### INTRODUCTION

It is well established that the pineal gland is involved in the regulation of the reproductive activity in most seasonal breeders<sup>1,2</sup>. It has also been reported that the pineal gland and its hormone melatonin, besides affecting the reproductive cycle, influence other seasonal functions like hibernation and body weight in a number of species<sup>3,4</sup>. The Indian palm squirrel, *Funambulus pennanti* shows a pineal dependent seasonal testicular cycle<sup>5</sup>. It is a tropical mammal exposed to diverse environmental conditions. Most of the research on the pineal gland has been done on Temperate zone animals. Keeping the above in view and considering the fact that so far there is no report on the changes in body weight, in relation to pineal gland in tropical species, the present investigation was aimed at observing the relationship between seasonal changes in body weight and pineal gland weight of an Indian tropical mammal, *Funambulus pennanti*.

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### MATERIALS AND METHODS

The study was performed during the months of April-August. Adult males of *Funambulus pennanti* were obtained in the first week of every month and acclimatized in a room fully exposed to ambient environmental conditions. They were housed in wire net cages and provided with food (soaked gram seeds) and water *ad libitum*. After one week they were divided into two groups of seven animals each. Animals of first group were weighed individually on a balance and their body weights noted. Animals of second group were pinealectomized by the technique of Haldar- Misra<sup>6</sup>. The pineal glands, after removal, were weighed quickly on a microelectrical balance. Two days after pinealectomy, all the animals were released back to the fields.

The above procedure was repeated every month between April to August. The data obtained was analyzed statistically with analysis of variance, ANOVA and correlation analysis<sup>7</sup>.

### RESULTS

Results are presented in Table 1. It is evident that the

body weight remained high between April- June (121.70-118.64 g). It decreased in July (94.05 g) and lowest body weight was recorded in August (80.10g).Pineal gland weight decreased from April to May and was lowest in June (1.05 mg).A sharp rise in pineal weight was observed in July (1.50 mg) and August (2.0 mg). Results of ANOVA indicated a significant variation in the body weight ( $p < 0.001$ ) and pineal gland weight ( $p < 0.001$ ) during the period of study. A significant negative correlation was observed between the pineal gland weight and body weight of the animal ( $r P\% - 0.953 \pm 0.135, p < 0.001$ ).

## DISCUSSION

The results clearly demonstrate a significant variation in the body weight and pineal gland weight of this tropical rodent between April - August. The present study also indicates a statistically significant negative correlation between the pineal gland weight and body weight of the animal. Although it has been suggested that the pineal gland and methoxyindoles secreted by it are involved in the regulation of the seasonal testicular cycle of this mammal<sup>8</sup> relationship of pineal gland with body weight has not been studied. In the present study an attempt has been made, for the first time, to observe the relation between pineal gland weight and body weight cyclicly. It is evident that as the pineal weight declined from April to June, the body weight of the animal remained steady and high. After June the pineal weight indicated an increasing trend whereas, on the other hand, the body weight was found to be decreasing during this period. This clearly shows a negative inverse correlation between these two parameters which was confirmed statistically.

A large number of animals show seasonal changes in body and lipid mass<sup>9,10</sup>.These responses occur due to changes in the photoperiod.. It is also suggested that change in photoperiod is transduced into a biochemical signal by the pineal melatonin<sup>11</sup>. Thus, the pineal gland is suggested to be involved in the regulation of changes in body fat. The pineal gland influences the period of some circannual rhythms in female golden mantled ground squirrels<sup>12</sup>.Siberian hamster, *Phodopus sungorus* exposed

to short days show decrease in their body weight and lipid mass<sup>13</sup>. This response can be observed by giving subcutaneous melatonin infusions to pinealectomized hamsters<sup>14</sup>. Studies with Djungarian hamsters also suggest involvement of pineal melatonin in physiological changes induced by short day photoperiods<sup>15</sup>. Effects on body weight during different periods of gonadal cycle have been studied in Syrian hamsters<sup>16</sup>.Role of pineal secretory activity in fat deposition has been suggested for male meadow voles<sup>17</sup>. It was shown that pinealectomy prevented reduction in body weight and white adipose tissue in male meadow voles transferred from long to short day lengths. Pineal gland can influence body weight changes in breeder turkey hens<sup>18</sup>.Most studies related to pineal gland and body weight have cent red on animals inhabiting Temperate regions. But animals exposed to tropical zones experience very different climatic conditions and hence show changes in their pineal functions as compared to temperate zone animals. In the present study also an inverse relationship was observed between the pineal weight and body weight, thus suggesting an inhibitory effect of pineal gland on the body weight of this animal. The present results also indicated a significant variation in the body weight as well as the pineal gland weight of *Funambulus.pennanti* during the different months of the study. Relationship between the pineal gland structure and body weight have been suggested in case of human<sup>19</sup>. However, no relationship between pineal acetyl serotonin methyltransferase activity and mean body weight was observed in the steel head trout, *Salmo gairdneri*<sup>20</sup>

Thus, the pineal gland by way of its hormone melatonin plays an important role in regulation of body weight in mammals..The present results indicate an inhibitory influence of pineal gland on the body weight of *F.pennanti*. The results of the study also suggest a possible role of pineal gland in regulation of seasonal changes in body weight of this mammal. Further investigations taking into consideration the annual changes in the body weight are needed to elucidate the precise role of pineal melatonin in the transduction of photoperiodic information for body weight regulation in this tropical mammal.

**Table 1. Variation in pineal gland weight (mg /100 g body weight) and body weight (g) of Indian palm squirrel, *Funambulus pennanti* during April – August.**

Indian palm squirrel, <i>Funambulus pennanti</i> during April – August.		
Month	Body weight	Pineal gland
April	121.70±2.10	1.50±0.012
May	120.85±3.22	1.11±0.012
June	118.64±3.10	1.05±0.010
July	94.05±2.23	1.50±0.014
August	80.10±2.36	2.0±0.010

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