



Review Paper

## Values of URIC Acid during Reproductive Cycle in Megachiropteran Bat *Rousettus Leschenaulti* (Desmerest)

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### Abstract

Variable values of uric acid in the male and female were registered throughout the reproductive cycle and therefore all over the three major seasons of the year. The mean range of uric acid recorded in the male was from 0.63 to 1.49 mg/dl. The higher values recorded were during June, May, February and April but significant decline was noted during September and October. Insignificant decline was registered during March, July, January and August. Variable results were obtained during November and December. The mean range of uric acid recorded in the female was from 0.72 to 1.48 mg/dl. The higher values recorded in declining manner as follows – May – June – March – February – April – January – August – July. Significant decline was noted from September and November. Variable results were obtained during November and December. In the present work Uric acid count was found to be variable according to the reproductive status of the male and female.

**Keywords:** *Rousettus leschenaulti*, uric acid, reproductive cycle.

### Introduction

The blood profile is affected by various factors such as age, gender and reproductive state, by endogenous rhythms of various metabolites as well as by external factors such as season, time of the day, food availability and quality<sup>1-4</sup>.

It is mainly the end product of nucleic acid metabolism. Some amino acids which are incorporated in purine biosynthesis too produce uric acid and the end product of their metabolism. Dietary ingestion of nucleoproteins adds to the uric acid pool. In normal tissues there is equilibrium between biosynthesis and degradation of nucleoproteins. Nucleoprotein degradation adds to the uric acid pool. Finally, in a tissue there is also equilibrium between formation of new cells and death of old ones. After a cell dies degradation of the nucleus also add to the uric acid pool. Uric acid is lost from the body via the gut or kidney. About one third is degraded by bacteria in the gut and about two third is lost in urine. Uric acid in the blood is not protein bound and therefore appears freely in the glomerular filtrate in the kidney. In the tubules, it is reabsorbed as well as secreted. During renal failure (failure of filtration) uric acid pool increases.

The objective of this present study is to investigate the relationship between the reproductive status of the male and female and the Uric acid count throughout the reproductive cycle. However, it is hoped that the results of this study will eventually be related to populations in other geographical areas and ecotypes and not only be restricted to India.

### Material and Methods

*Rousettus leschenaulti* has a widespread distribution extending from Sri Lanka and Pakistan to Myanmar, Vietnam, Southern China, Java and Bali. In the Indian subcontinent, almost all states show localities of *Rousettus leschenaulti*. In Maharashtra *Rousettus leschenaulti* are distributed in Ghatmatha ; Chikalda; Elephanta; Jogeshwari; Kanheri; Khandala; Alibag; Mahabaleshwar; Aurangabad; Ratnagiri<sup>5</sup>; Marathwada; Satara ; Pune; Mansar; Kandri; Ellora<sup>6</sup>. This old world Indian fruit bat, *Rousettus leschenaulti* (Desmerest) is selected for the present study because of its easy availability in the vicinity of Nagpur city.

The specimens of *Rousettus leschenaulti* were collected with the help of mist net placed at the entrance of Mansar / Kandri mines near Nagpur once every calendar month throughout the complete reproductive cycle. Blood sample (2 ml) were collected in Eppendorf tubes and into 6 to 8 heparinized capillary tubes after puncturing a wing vein. After blood sampling each bat was released. The blood was analysed at the Shri Sainath Diagonosis and Research Center, Nagpur using cell counter machine to determine hematological characteristics : total Leukocyte count (WBC).

**Observations:** Variable values of uric acid in the male and female were registered throughout the reproductive cycle and therefore all over the three major seasons of the year. The mean range of uric acid recorded in the male was from 0.63 to 1.49 mg/dl. The higher values recorded were during June, May,

February and April but significant decline was noted during September and October. Insignificant decline was registered during March, July, January and August. Variable results were obtained during November and December.

The mean range of uric acid recorded in the female was from 0.72 to 1.48 mg/dl. The higher values recorded in declining manner as follows – May – June – March – February – April – January – August – July. Significant decline was noted from September and October. Variable results were obtained during November and December. Thus *Rousettus leschenaulti* revealed significant sexual difference in either sexes. (Bar Diagram) (Table 1).

### Result and Discussions

The Indian fruit bat, *Rousettus leschenaulti* shows a peculiar breeding cycle. Adult males show double peaks in their testicular weight corresponding to the two pregnancy cycles of

the female. The first peak occurs during October–November and the second during February–March. Females show I-pregnancy cycle from December to April and IInd – Cycle from April to July.

The blood profile is affected by various factors such as age, gender and reproductive state, by endogenous rhythms of various metabolites as well as by external factors such as season, time of the day, food availability and quality<sup>7,8</sup>.

The Uric acid values throughout the reproductive cycle in both the male and female *Rousettus leschenaulti* varied as tabulated in the tables 1 and 2. The results of the present study suggest that the blood profile for *Rousettus leschenaulti* serve as a good indicator of their physiological state. The logic behind adding the month to the analysis is that the physiological state of free living bats may change throughout the year, depending on food availability and food type and quantity.

**Table-1**  
**Uric Acid values for male *Rousettus leschenaulti* during reproductive cycle (2003 – 2004)**

Date of Collection	Reproductive Status (n=3)	Uric acid (mgm%)
31/07/03	Male inactive	1.10±0.24
29/08/03	Male inactive	1.02±0.19
29/09/03	Male approaching maturity	0.63±0.11
21/10/03	Male approaching maturity	0.70±0.04
20/11/03	Male Active	0.90±0.04
29/12/03	Male Active	0.92±0.07
25/01/03	Male Active	1.05±0.08
28/02/03	Male Active	1.40±0.18
25/03/04	Male Active	1.25±0.26
25/04/04	Male Active	1.38±0.15
27/05/04	Male regressed	1.42±0.09
24/06/04	Male regressed	1.49±0.10

(Values are mean ± S.E.). P < 0.01 values are significantly different at various reproductive stages.

**Table-2**  
**Uric Acid values for female *Rousettus leschenaulti* during reproductive cycle (2003 – 2004)**

Date of Collection	Reproductive Status (n=3)	Uric acid (mgm%)
31/07/03	Late pregnancy/just delivered	1.0±0.05
29/08/03	Lactating female	0.7±0.14
29/09/03	Anaestrous	0.72±0.14
21/10/03	Proestrus	0.9±0.14
20/11/03	Female at Oestrous	0.7±0.14
29/12/03	Ovulation / Early pregnancy	0.94±0.12
25/01/03	Mid pregnancy	1.10±0.14
28/02/03	Advanced pregnancy	0.82±0.54
25/03/04	Just delivered / post partum oestrous	0.9±0.14
25/04/04	Lactation / early pregnancy/ abortion	0.7±0.14
27/05/04	Mid pregnancy	0.73±0.47
24/06/04	Advanced pregnancy / abortion	0.8±0.14

(Values are mean ± S.E.)

P < 0.01 values are significantly different at various reproductive stages.

To correlate the highest values recorded in *Rousettus leschenaulti*, earlier literature was searched, a number of factors have been found to be responsible – thus physical activity and diet elevates the uric acid value but renal functioning is primary<sup>9</sup> in human. The levels of uric acid were fluctuante in male and female *Rousettus leschenaulti* during rainy seasons (July/August) may be due to higher abundancy of fruits and no risk to dehydration.

Apart from hibernation, physical activity also elevates plasma uric acid<sup>9</sup> but diet and physical activity probably secondary to renal function in elevating plasma uric acid levels in the spring<sup>10</sup>. The decreasing uric acid levels in the spring is consistent with the hypothesis that the bears slowly regain renal function after winter dormancy and shift from fat metabolism to a varied regimen of fat, protein and carbohydrate. During summer the black bears showed higher circulating values of uric acid suggestive of regaining of renal function. The reduced intake of food with high

proportion of nucleic acids such as liver and kidney suggest lower uric acid.

Our mean values of uric acid during different stages of reproductive / seasonal changes registered in *Rousettus aegyptiacus*, winter (0.66 mg/dl); spring (1.38 mg/dl); summer (0.60 mg/dl); autumn (0.01 mg/dl) which is also a fruit eating bat<sup>4</sup>.

In the present study the higher values of uric acid may suggest high hematocrit values of blood since bats lose water at higher ambient temperature. Moreover, bats have a wide range of renal activity. The renal capacity to concentrate urine is not always dependent upon long loop of Henle but kidney in bats has cells which can concentrate urine without the long loops of Henle and therefore excretion of uric acid<sup>11</sup>. Finally it is concluded that the levels of uric acid in the blood is not related to reproductive cycle excepting during pregnancy, but it can be suggested that wide range of kidney functioning and special cells of the kidney are the main regulatory organs.

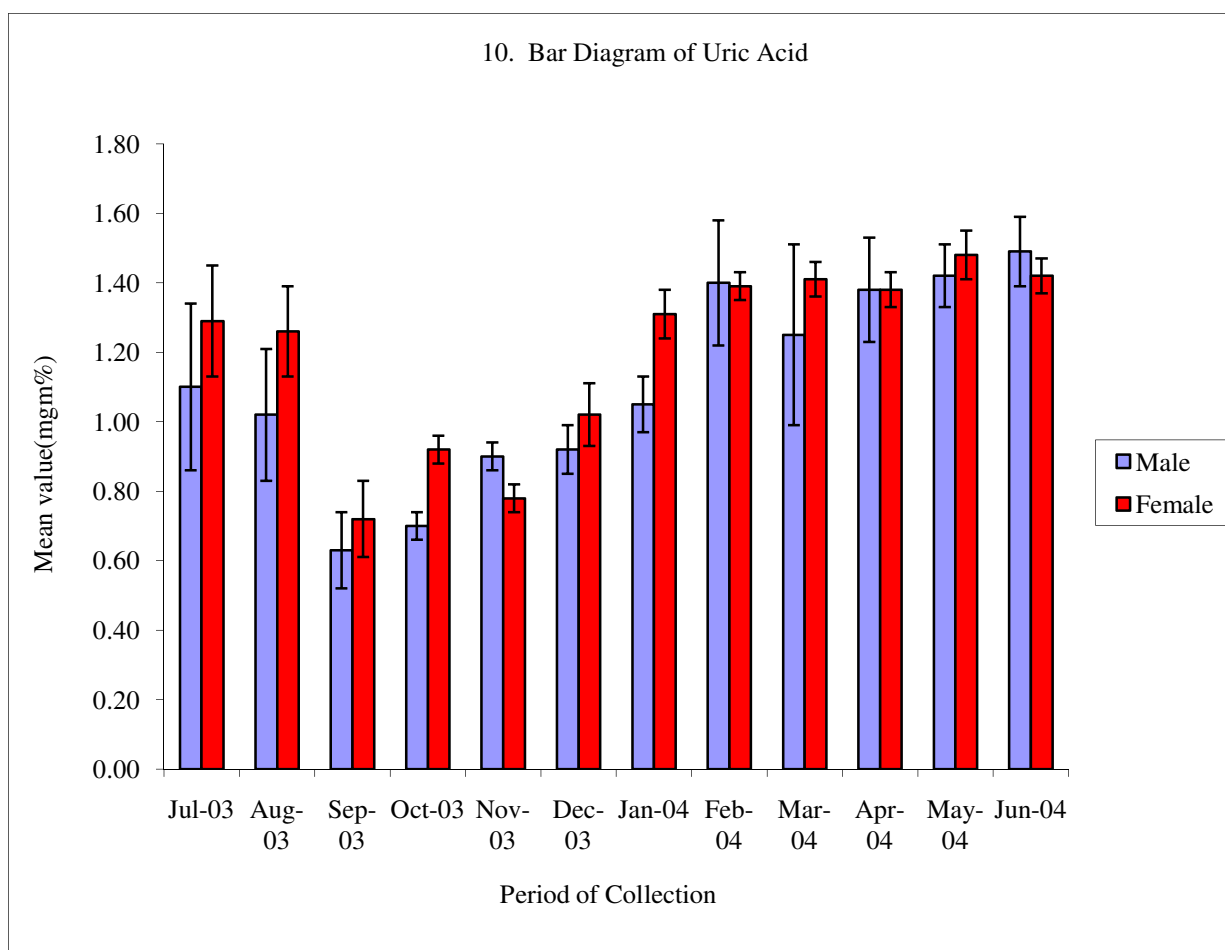


Figure-1  
 10. Bar Diagram of Uric Acid

## Conclusion

From the foregoing it is concluded that the various values obtained for the Blood is variable, not only subjected to various factors such as age, gender and reproductive state, by endogenic rhythms of various metabolites as well as external factors such as season, time of the day, food availability and quality, method of capture, temperature, psychic and muscular activity.

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