Values of Serum Creatinine During Reproductive Cycle in Megachiropteran Bat *Rousettus leschenaulti* (Desmerest)

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Abstract:

Creatinine is normally formed by the muscles. It is formed in the body at a relatively constant rate. It is apparently derived from the metabolism of the high-energy phosphate compound, phosphocreatine. Creatine is found abundantly in muscle and is composed of amino acids: glycine, arginine and methionine. Creatinine is solely derived from creatine. Serum creatinine values rise in renal failure. It is present in maximum amount in the striated muscle. Smaller amounts are found in the smooth muscle, testes, liver and kidney. Creatinine is a waste material. This creatinine is readily excreted in the urine. Creatinine excretion increases during pregnancy.

In the present study the mean blood creatininelevel was found to be in the range of 0.60–1.2mg% in the male Rousettus. The creatinine was found to be highest during September when the male was approaching maturity. Similarly the mean ranges from creatinine in the female were noted to be 0.7 – 1.10 mg%. The higher values were noted during January (mid-pregnancy). The objective of this present study is to investigate the relationship between the reproductive status of the male and female and the Serum Creatinine values throughout the reproductive cycle.

Key words: Rousettus, leschenaulti, Creatinine, blood, reproductive cycle.

Introduction:

Blood is considered a tissue consisting of red blood corpuscles (erythrocytes), white corpuscles (leukocytes), platelets and the liquid plasma. It is a carrier for gases, oxygen, carbon dioxide, metabolites, and products of digestion, hormones, enzymes and clotting factors. It has many buffer systems and has many diverse functions. The substances present in the blood could be divided into three major types: The proteins like albumins and enzymes, neutral, molecules like glucose and cholesterol and ionic species (electrolytes) like sodium, potassium, chloride, calcium and bicarbonate. Regarding nitrogen – containing substances alone, they are of two type's viz. the proteins and the non-protein nitrogen(urea, creatinine, uric acid) substances.

Bats had mastered flight eons before man's own lineage began. Their unique volitional mode was obviously advantageous, for adaptive radiation within the group has been little short of extraordinary. Bats are relatively inconspicuous only because they are active by night, hidden by day and

wary of human contact. Possibly these are the reasons they are not studied as vigorously as other mammals before the turn of the century. Since then, however, because of the striking and sometimes bizarre specializations of bats a growing awareness of their importance to the economy and health problems of man have stimulated an increased scholarly interest in the group so that today our knowledge of Chiroptera has grown to sizeable proportions.

The blood profile is affected by various factors such as age, gender and reproductive state, by endogenic rhythms of various metabolites as well as by external factors such as season, time of the day, food availability and quality (Van der Westhuyzen, 1978; Minematsu, et al. 1995; Korine, et al. 1999).Studies on the blood profile of Megachiropteran bats are scarce and the available data are based on captive bats (Van der Westhuyzen, 1978, Widmaier and Kunz, 1993, Heard and Whittier, 1997; Korine, et al. 1999). Seasonal changes in blood chemistry have yet to be described in any of the Indian bat with the exception of cellular components.

Since there is no information so far concerning the blood and its formed elements and serum chemistry in any Indian bat excepting a small note on the haematology of the Indian false vampire, *Megaderma lyralyra* (Gopalkrishna and Chitle, 1973) only in adult male and female and juvenile bats, but not during the reproductive cycle, during different phases of male maturity and oestrous cycle, pregnancy and lactation period. Thus the present work is an attempt to correlate the profile of blood and reproduction. The fact that many physiological conditions are accompanied by a variation in the blood composition has led us to investigate the composition of blood study in the *Rousettus leschenaulti* during the reproductive cycle. Our study from July 2003 to June 2004 is an attempt to investigate the blood chemistry of *Rousettus leschenaulti* during reproductive cycle. Such data can be used as a basis for comparison during the reproductive cycle of the Indian bat and to stimulate others to further define haematological and serum chemistry characteristics, in the Indian bats. Apart from changes in the reproductive status of the animal haematological data can be used to make comparisons between populations for purposes of taxonomy and phylogeny and for determining population differences in nutritional status. These data are also necessary to determine the influences of handling stress, immobilization and nutrition. The objective of present study is to investigate the relationship between the reproductive status of the male and female and the serum creatinine characteristic throughout the reproductive cycle.

Material and methods:

Rousettus leschenaulti has a widespread distribution. In Maharashtra *Rousettusleschenaulti* are distributed in Ghatmatha ; Chikalda; Elephanta; Jogeshwari; Kanheri; Khandala; Alibag; Mahabaleshwar; Aurangabad; Ratnagiri (Brosset, 1962); Marathwada; Satara ; Pune; Mansar; Kandri; Ellora (Gopalakrishna and Madhavan 1970). 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 samples (2 ml) were collected in Eppendorf tubes and into 6 to 8 heparinised capillary tubes after puncturing a wing vein. After blood sampling each bat was released. Serum uric acid analysis was performed using a Technicom semi auto analyzer (RA50 Technicom, Germany) (Saini and Kaur, 1996; Sood, 1996; Ramakrishnan, et al. 1998; Choudhari, 2002 and Godkar and Godkar, 2003).

Result and discussion:

In the present study the mean blood creatinine level was found to be in the range of 0.64 – 1.2mg% in the male *Rousettus*. During the complete reproductive cycle of male there are two peaks of activity. The creatinine was found to be highest during September when the male was approaching maturity. During the period of spermatogenic inactivity (July / August) and during testicular activity (October /March / December / January / February / November) there was insignificant decline in the values but significant decline was observed during testicular regression period of male (May and June).

Similarly the mean ranges from creatinine in the female were noted to be 0.7 – 1.10 mg%. The higher values were noted during January (mid-pregnancy), slight decline during (July – late pregnancy + delivery); December ovulation + early pregnancy); February (advance pregnancy); September (anoestrous). The constant values were found during October (Proestrous) and March (Just delivered + post partum estrous). The creatinine values rises during pregnancy. An insignificant difference was observed in the mean values of creatininein both the sexes. Regarding the difference in the values of both the sexes Hellgren, et al. 1989 in bears have registered more creatinine in the adults of both the sexes.

The mean range of creatinine in the *Rousettus* resembles the normal range of human (0.8 – 1.4mg%) which is a good indicator of renal functioning. Moreover, *Rousettus* does not undergo torpor or hibernation

therefore no change in the creatinine values were recorded throughout the cycle excepting during pregnancy the highest values in the female were recorded as described in the human (Dailey, 1996), may be due to renal failure. Testis in male also show presence of creatinine during September, we also noted the highest values when the process of spermatogenesis has just begun since creatinine is needed for sperm maturation because it flows in the epididymal tubules. Creatinine is taken up by the principle cells of epididymis into the lumen, for implicating in the development of the potential of sperm motility.

Table.1– Serum Creatinine values for male *Rousettusleschenaulti*during reproductive cycle (2003 – 2004)

Date of Collection	Reproductive Status	Creatinine (mgm%)
31/07/03	Male Inactive	1.1±0.03
29/08/03	Male Inactive	0.9±0.08
29/09/03	Male approaching	1.2±0.13
21/10/03	Male approaching	1.0±0.06
20/11/03	Male active	0.7±0.14
29/12/03	Male active	0.77±0.31
25/01/03	Male active	0.72±0.40
28/02/03	Male active	0.64±0.29
25/03/04	Male active	0.80±0.14
25/04/04	Male active	0.9±0.14
27/05/04	Male regressed	0.6±0.14
24/06/04	Male regressed	0.6±0.14

Table. 2– Serum Creatinine values for female *Rousettus leschenaulti*during reproductive cycle (2003 – 2004)

Date of Collection	Reproductive Status	Creatinine (mgm%)
31/07/03	Late pregnancy/just delivered	1.29±0.16
29/08/03	Lactating female	1.26±0.13
29/09/03	Anaestrous female	0.72±0.11
21/10/03	Proestrus female	0.92±0.04
20/11/03	Female at Oestrous	0.78±0.04
29/12/03	Ovulation / Early pregnancy	1.02±0.09
25/01/03	Mid pregnancy	1.31±0.07
28/02/03	Advanced pregnancy	1.39±0.04
25/03/04	Just delivered / post portumoestrous	1.41±0.05
25/04/04	Lactation / early pregnancy/ abortion	1.38±0.05
27/05/04	Mid pregnancy	1.48±0.07
24/06/04	Advanced pregnancy / abortion	1.42±0.05

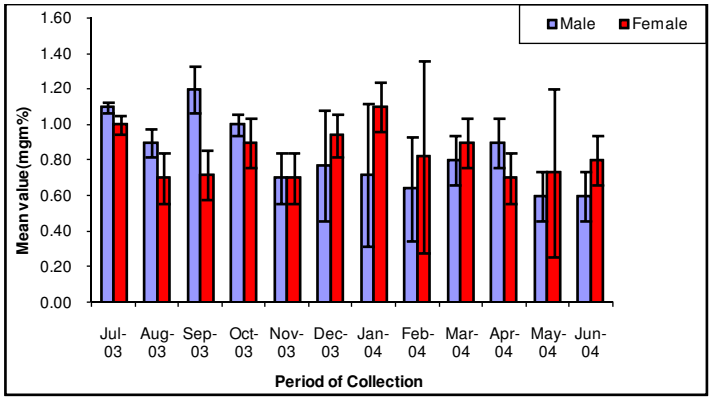

Figure.1- Bar Diagram of Creatinine

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