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## **INFLUENCE OF GENDER ON THE DIURNAL VARIATION OF URINE PRODUCTION AND MICTURITION CHARACTERISTICS OF THE RAT**

### **AIM OF STUDY**

To examine the diurnal variation in the frequency/volume (f/v) characteristics of male and female conscious rats with reference to fluid consumption.

### **MATERIALS & METHODS**

We evaluated the micturition v/f characteristics of 10 male and 10 female SD rats, weighting  $399\pm 15$  and  $249\pm 3$  g respectively. Initially an accommodation period of one week, on 12/12 light/dark cycle, was established with access to food and water. To standardize initial fluid loading dose of 3 mL/kg oral dose of saline was administered and micturition studies initiated by placing the rats in metabolic chamber for 24 hours having free access to water. To monitor micturition characteristics the voided volume was collected by a container resting on a digital Sartorius balance interfaced to a PC and data stored continuously on disc. The total volume of water consumed was also measured. For each animal two studies were performed and the data collected averaged. Data presented are expressed in terms of kg animal body weight, and f/v parameters were averaged into 3 hr bin widths. Statistical measures are given as mean $\pm$ SE.

### **RESULTS**

Over a the total 24 hr period of observation water consumption:  $33.2\pm 4.4$  vs.  $61.0\pm 8.3$  and urine production  $59.9\pm 5.7$  vs.  $84.9\pm 8.7$  mL/kg was significantly larger ( $p<0.01$ ) in females than in males. The mean volume voided per micturition relative to time of day or night is given by Figure 1 and the frequency of micturition is given by Figure 2 showing that there are gender and diurnal differences in the f/v characteristics. Figure 1 and 2 also show that males have a more clearly diurnal variation than females. Figure 3 illustrates the diurnal variations in urine production rate, shows that female rats have a significantly higher urine production rate than male rats.

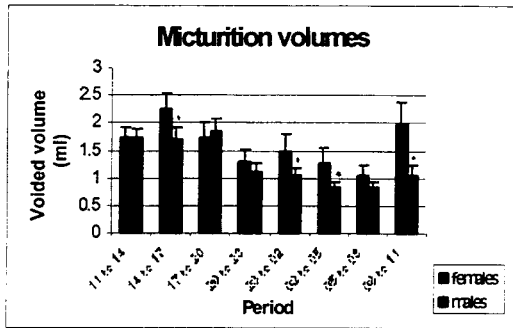


Figure 1

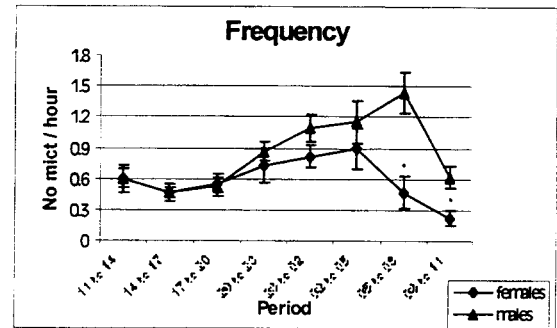


Figure 2

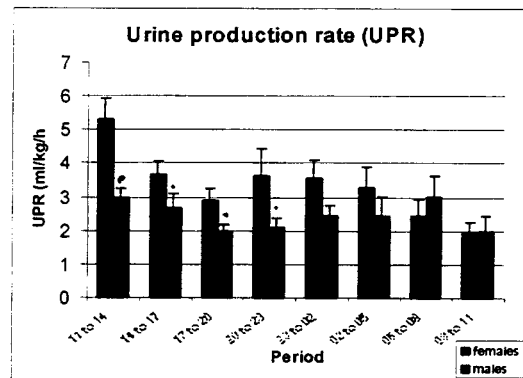


Figure 3

## CONCLUSION

The present study demonstrated that frequency and associated volume voided during each micturition are influenced by gender as well as the time of day or night at which observations are made. In addition it is shown that there is a gender difference in the amount of water consumed which in turn may be responsible in modulating the f/v characteristics. Overall the evidence suggests that female rats demonstrate the highest diurnal variability in both intake and output. In view of these observations it is important to consider whether the observed diurnal and gender variability in f/v and water intake is present in the human. Furthermore in experimental conditions of pharmacologic evaluation of new drugs using the rat it may be essential to consider the contribution of gender and diurnal variation as contributing factors affecting the results. Finally consideration should be given to the possibility that specific gender and diurnal influence of the drug may directly influence urine production and thereby affect the demands placed on the storage function of the bladder.