

GENDER-DEPENDENT EFFECT OF ADRENALECTOMY ON THE BLOOD PARAMETERS IN ALBINO RATS (*Rattus norvegicus albinus*)

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ABSTRACT

A decrease in the level of RBC count, haemoglobin (Hb) content, packed cell volume (PCV) and mean corpuscular volume (MCV) along with an increase in mean corpuscular haemoglobin (MCH), mean corpuscular haemoglobin concentration (MCHC) and white blood cell (WBC) count were observed in the male and female shamoperated (SO) and adrenalectomized (ADX) rats on day 15 and day 30 of experimentation. The degree of these changes was more on day 30 than day 15 and also in females than in males. The results indicated inhibition of Hb synthesis and deleterious effect on the haemopoietic system in ADX rats. Increase in WBC could be to increase the immunity to adrenalectomy. In addition to haematological changes, a decrease in the levels of testosterone and estrogen was also observed, respectively in the blood of male and female ADX rats on days 15 and 30 of experimentation, possibly indicating a suppression of sex-hormone production following adrenalectomy. In between the two sex groups the per cent decrease of testosterone was greater on day 15 in male ADX rats than the decrease of estrogen in female ADX rats, whereas an opposite trend was observed on day 30. It appears that the susceptibility to adrenalectomy increased with the duration in both the sex groups, and it was more in females than in male rats.

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The importance of haematology in clinical biochemistry, population genetics and medical anthropology is well established. In mammals and in other lower chordates the haematological parameters are reported to vary with sex (Srihari and Shakunthala Sridhara, 1986), age and season (Sealander, 1964). Primary adrenal insufficiency results in the decrease of circulatory antibodies and defects in T-lymphocyte function such as decrease in suppressor activity (Levine, 1991). The traditional laboratory experiments revealed that adrenal insufficiency leads to normochronic and normocytic anaemica, lymphocytosis with increased eosinophil count (DeGroot and Jameson, 2001). But, detailed haematological studies in adrenalectomized rats in relation to both genders are absent. Hence the present study has been taken up to understand the influence of adrenalectomy on blood parameters of male and female rats.

Adrenal steroids play an important role in the regulation of estrus cyclicity and gonadotropin production in rats (Ma *et al.*, 1998). Estrogen is the major female steroidal hormone secreted by the ovary during the follicular phase of the menstrual cycle. An increase in the activity of estrogen in the body leads to diminished

liver function, hyperestrinism (Guyton and Hall, 2000). Testosterone plays a major role in the development and maturation of sperms during the process of spermatogenesis. Maintenance of testosterone levels within the sertoli cells is essential for the development of adequate numbers of mature and viable sperms that are necessary for a male to be fertile (Almeida *et al.*, 2000). But, the effect of adrenalectomy on the levels of these steroidal hormones is not well reported. Hence, the present study also includes the estimation of testosterone and estrogen levels in the blood of ADX rats of males and females.

MATERIALS AND METHODS

Healthy Wistar strain male and female albino rats (*Rattus norvegicus albinus*) (age, 120 days; and body weight, 220±10g) were selected for the present study. The selection of albino rats is based on its ability of survival, its withstanding capacity in a fairly wide range of stress conditions and its maintenance and handling is quite comfortable. The stock of the litters was obtained from Indian Institute of Sciences, Bangalore. The rat colony was maintained in laboratory at 28±2°C and 12 hours light and 12 hours of darkness. Rats were fed on standard rat diet obtained from Hindustan Lever Ltd., Bangalore, and water was supplied *ad libitum*.