

A study on the protein metabolism and histology of the liver of male and female albino rats (*Rattus norvegicus albinus*) on adrenalectomy

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A significant decrease in the levels of total proteins along with an increase in the levels of free amino acid (FAA) and ammonia and activities of protease, alanine aminotransferase (AlAT), aspartate amino transferase (AAT) and glutamate dehydrogenase (GDH) were observed in the liver of male and female rats on adrenalectomy (ADX) at day 15 and day 30 compared with sham operated (SO) rats. These results indicated significant proteolysis and active trans-deamination in the hepatic tissue of rats on adrenalectomy. Increase in protease activity and amino acid levels could be due to the turnover of proteins for metabolic reorganization. The magnitude of those changes were significantly more in the liver of female ADX rats than in the liver of males. It revealed more susceptibility of females to adrenalectomy than the males. Longer the duration of adrenalectomy more is the protein breakdown in both the sexes as noticed from day 15 to day 30. Corresponding to the changes in protein levels some degenerative changes in the histology were observed in the liver of male and female ADX rats at day 15 day 30 compared to normals. A mild degree of destruction of hepatocytes with darkened nuclei and widening of sinusoidal spaces in few regions were observed at day 15 and severe cytoplasmic and nuclear damage at day 30 in the liver of ADX males suggest that adrenalectomy leads to decreased protein synthesis. The female ADX rats showed widening of sinusoidal spaces in few regions at day 15 and on day 30 the nuclei of hepatocytes shrunken, while karyolysis is also observed in few nuclei. These changes support that female rats proved to more vulnerability on ADX stress than the male ADX rats. In conclusion the observations, indicated proteolysis and active trans-deamination to favour to gluconeogenesis for energy production in the hepatic tissues of rats on adrenalectomy. It could lead to structural disruption and decreased metabolic ability that appeared more in females than in males on ADX, and in both the sexes it increased with the duration of adrenalectomy.

Key words : Albino rats, Adrenalectomy, Liver, Proteins, Histology

INTRODUCTION

Adrenal gland is an important endocrine gland which secretes hormones concerned with carbohydrate, proteins and lipid metabolisms, balance of electrolytes in blood, maintenance of circulatory blood volume, control of sexual maturity and regulation of extracellular fluid volume. Any stress on an animal invokes compensatory metabolic adjustments in its organs through modification and modulation of the quality and quantity of various biochemical constituents including enzymes (Assem and Hunke, 1983).

Removal of endocrine gland would deprive the organism at various levels if its normal source of hormones are not available. Measurable abnormalities appear in the individual during its life history. Bilateral removal of adrenal gland thus leads to a number of metabolic disturbances which are identical with those appearing in patients with Addison's diseases, such as extreme muscular weakness, a variable degree of hypoglycemia, ceased growth in young animals, loss of body weight, electrolyte imbalance and decreased reproductive function (De Groot

and Jameson, 2001).

The liver is one of the most metabolically active tissues. It has important functions in the metabolism of all the three principle dietary constituents like proteins, carbohydrates and lipids. Increase in protein synthesis in the liver is an important action of the adrenal steroids on increased metabolic availability of aminoacids (Guyton and Hall, 2000). However, there are no reports available on the effect of adrenal dysfunction on the proteins and histology of the hepatic organ of rats. Hence, it is of interest in the present study to trace out the effect of adrenalectomy on protein levels and histology of liver of male and female albino rats.

MATERIALS AND METHODS

Healthy Wistar strain male and female albino rats (*Rattus norvegicus albinus*) of the age of 120 days and body weight 220 ± 10 g have been selected for present study. The selection of albino rats is based on their ability of survival, more withstanding capacity in a fairly wide range of stress conditions and easy maintenance and handling.