SHORT COMMUNICATION

CHANGES IN BRAIN CHOLESTEROL AND ITS REGIONAL DISTRIBUTION UNDER THE INFLUENCE OF PREDNISOLONE

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Summary : Male albino rats were studied for effect of prednisolone on brain cholesterol and water content. Oral administration of prednisolone (5 *mg/kg* rat/day for 21 days) results in reduction of brain weight and brain cholesterol content but no change in brain water content was seen. The reduction of cholesterol may be the cause of disorders found in neural functions in conditions of glucocorticoid excess.

Key words : prednisolone brain cholesterol water

INTRODUCTION

Synthetic glucocorticoids like prednisolone, dexamethasone, betamethasone are widely used in day to day practice. They are known to cause various side effects including in nervous system (1,2). It is known that they affect the synthesis and excretion of cholesterol in liver and adrenal cortex (3,4). Cholesterol is an important constituent of nervous system (5) and its alteration noted in different diseases (6). It would be interesting to know the effect of glucocorticoids on brain cholesterol. The present work was aimed to study the cholesterol content after prednisolone treatment.

MATERIAL AND METHODS

Total 40 male albino rats, all 45 days old and body weight between 100 to 110 *gm* were taken. Half of the rats were given prednisolone (Wysolone Wyeth) in the dose of 5 *mg/kg* of body weight daily orally and the rest were taken as control. The animals

were kept in identical laboratory conditions on standard laboratory diet (7,8). Water was given *ad libitum*.

On the 22nd day of experiment all the animals were sacrificed by decapitation. The brains were separated and weighed. Ten brains of each group were dehydrated in dessicator and weights were taken on every third day until there was no change in weight and water content was calculated.

Rest of the brains were taken for cholesterol estimation after separation of cerebrum, cerebellum and brain stem. The materials were homogenized with distilled water (20 *ml/gm* of tissue) separately and with 0.5 *ml* of this homogenate, cholesterol estimation was done by method of Bloor (9).

RESULTS AND DISCUSSION

Control group showed high amount of cholesterol in the whole brain as well as in individual parts. Treatment with prednisolone showed a significant reduction of brain cholesterol. Whole brain cholesterol was reduced by 21.5% and there were 20.5% reduction in cerebrum, 45.3% in cerebellum and 20.1% in brain stem, all were stastically highly significant.

Regarding water content no significant change could be seen in the treated group in relation to control.

Cholesterol is an important constituent of brain, high rate of deposition is seen in nervous system show changes in brain cholesterol (6).

In the present work the brain cholesterol values are slightly higher than the other observers (11) in the control groups. In the treated groups cholesterol of whole brain as well as in diferent parts were significantly reduced. Cholesterol is an important constituent of membrane and its alteration should affect membrane function which is very critical in neural functions. The changes in neural function (1,2) in cortisol excess syndromes may be related to this effect of glucocorticoid on brain cholesterol.

The synthetic analogues of glucocorticoid are used to treat brain oedema (12,13) but in this present work, no significant reduction of water content was seen. So it may bebe that in this case, glucocorticoids may act in some other ways.

TABLE I : Regional distribution of cholesterol in different experimental conditions and water content of brain.

	Cholesterol in grams/100 gm of fresh weight (n=10)				*Water content and weight of whole brain (n=10) in grams*		
	Whole brain Mean±S.E.M.	*Cerebrum Mean±S.E.M.*	*Cerebellum Mean±S.E.M.*	*Brain Stem Mean±S.E.M.*	*Wet Weight Mean±S.E.M.*	*Dry weight Meen±S.E.M.*	*Water content Mean±S.E.M.*
Control	2.691 ±0.058	2.416 ±0.067	1.715 ±0.085	5.203 ±0.111	1.608 ±0.025	0.317 ±0.009	1.291 ±0.057
Treated	2.113 ±0.089	1.920 ±0.090	0.938 ±0.035	4.156 ±0.098	1.581 ±0.031	0.308 ±0.003	1.273 ±0.061
P – Level	P<0.001	P<0.001	P<0.001	P<0.001	P>0.05	P>0.05	P>0.05

S.E.M. = Standard error of mean.

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