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AMELIORATION OF HYSTERECTOMY - INDUCED ACCUMULATION OF HEPATIC TISSUE LIPIDS BY PHYSICAL EXERCISE IN ALBINO RATS

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SUMMARY

Accumulation of hepatic lipids in female rats was evident by sixty days after hysterectomy. However, subjecting the hysterectomized animals to a few regular swimming exercises for 45 days, beginning 15 days after the surgery prevented lipid accumulation and maintained the normal levels of total lipids, phopspholipids and neutral lipids in the liver, suggesting that the impairment in hepatic lipid metabolism in hysterectomized rats can be prevented by physical exercise.

Key words : Cholesterol; Glycerides, Hepatic lipids, Hysterectomy; Phospholipids.

INTRODUCTION

Hysterectomy is employed as the method of choice in many gynaecological disorders and also for permanent sterilization by some. In the case of uterine cancer, hysterectomy is compulsory and widely practiced (1.2). Hysterectomy leads to hypoestrogenic and hypogonadotropic conditions in a number of animals as well as women (3-9) Oxidative metabolism which regulates mobilization of tissue lipids depends upon the circulating levels of estrogens in female animals (10,11). In this paper, we report the changes in the pattern of hepatic tissue lipids after hysterectomy and the ameliorating effect of physical exercise on the same.

MATERIALS AND METHODS

Healthy adult female albino rats of Wistar strain with a body weight of 120 ± 5g and regular sexual cycles were divided into two batches. The first batch of rats were subjected to bilateral surgical hysterectomy by standard abdominal approach (12). The second batch of rats were subjected to sham operation to serve as controls. Among the hysterectomized rats half of them were subjected to regular swimming exercises from 15th day after hysterectomy till 60th day. The remaining hysterectomized rats were maintained upto 60th day and termed as hysterectomized control. All the three batches of rats were maintained on a pelleted rat feed

supplied by Hindustan Lever Limited (Bombay) and water *ad-libitum*. The cyclicity of rats were observed daily. At the end of the experimental period, all rats were killed by cervical dislocation and the liver was isolated in cold conditions and subjected to biochemical assays viz., total lipids (13) triacylglycerol (14) free fatty acids (15) cholesterol (16) and phospholipids were analysed using standard methods

RESULTS AND DISCUSSION

The sham operated control rats maintained regular oestrous cyclicity whereas, hysterectomized rats exhibited delayed oestrous cycles with conspicious prolongation of metestrous and diestrous stages. The metestrous phase was delayed by two and half folds time in hysterectomized rats, when compared with the controls. Similarly, there was a two fold delay in the completion of diestrous stage. Physical exercise maintained regular oestrous cycles in hysterectomized rats at par with the sham operated controls (18-21). Thus, there were conspicious irregularities in the oestrous cycles of hysterectomized rats.

The organic reserves in the liver have been widely reported to be mobilized into the circulation after physical exercises (21-24) in rats.

Table 1 : The levels of total lipids, triacylglycerl, free fatty acids, cholesterol and phospholipids in liver of control, hysterectomized and exercised hysterectomized rats.

Parameters (mg/g wet wt.)	Sham operated Control	Hysterectomized	Hysterectomized and Exercised
Total lipids	63 88 ±4 112	118 67 @ ± 5 92 (+ 85 77)	68.31 ᵇ ±3 11 (-42 43)
Triacylglycerol	2 23 ± 0 07	3 64 @ ±0 10 (+ 63 13)	2 76 ᵇ ±0 01 (-26 70)
Free fatty acids	14 65 ±2 11	24 84 @ ± 2 03 (+ 69 58)	12.14 ᵇ ± 1.20 (-51 14)
Cholesterol	4 45 ±0 14	5 98 @ ± 0 11 (+ 34 25)	4 86 ᵇ ± 0 44 (-18 67)
Phospholipids	37 20 ± 2 83	62 24 @ ±5 12 (+ 67 34)	41 40 ᵇ ± 3 79 (-33 48)

Each value is mean ± S D of six individual observations

@ p<0 001 vs control ᵇ p<0.001 vs hysterectomized rats Values in parantheses denote percentage increase (+) or decrease (-) from the control and hysterectomized rats, respectively

In the present study, the hepatic tissue of hysterectomized rats showed significant elevation in the levels of total lipids, triacylglycerol, cholesterol, free fatty acids and phospholipids over the sham operated controls with suppressed lipase activity of the tissue. The hepatic tissue had an overall accumulation of all the lipid fractions. This shows that hysterectomy inactivates of the mobilization of lipid components. The decreased lipase activity might be responsible for the accumulation of lipids. This can be correlated to decreased oxidative metabolism owing to low level of estrogen in circulation. So, there is a possibility for the hepatic cells to get overloaded due to fat accumulation in hysterectomized rats.

Decreased lipid content in exercised hysterectomized animals indicates the activation of hepatic tissue lipolysis by physical exercises (25-27). Thus, the hysterectomized rats when subjected to physical exercises might have mobilized the hepatic lipid content towards the metabolic activities. The decreased levels of free fatty acids after physical exercises suggests active mobilization towards the tissue energy metabolism or influx into the blood. Thus, lipid deposition in the hepatic cells of the hysterectomized rats was probably, averted by the induction of physical exercises.

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