

OVARIAN LIPID PROFILES IN HYSTERECTOMIZED ALBINO RATS

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ABSTRACT

Bilateral hysterectomy has been performed in adult wistar strain albino rats and ovarian lipid profiles were compared with the controls. The tissue had decreased total lipid content with activated lipolysis on hysterectomy. The phospholipid content, free fatty acid and triglycerides were depleted while the cholesterol and glycerol were accumulated. The importance of these changes on the physiological activities of the ovary is discussed.

INTRODUCTION

UTERINE removal was associated with changes in ovarian function, sexual cycles and hormonal levels¹⁻⁶. Suppressed ovulation was reported in most animals after hysterectomy⁷. Hysterectomy extended the luteal phase of the sexual cycle²⁻⁵. The effect of hysterectomy on the ovarian function is not yet clearly understood². The plasma concentration of estrogen, progesterone and gonadotropins were decreased in several mammalian species after hysterectomy^{6,8}. The ovarian function in general and sex steroid function in particular are dependent on the mobilization of lipids into ovarian metabolism⁹. In view of changes in the plasma steroid levels and disfunction of the ovary during hysterectomy^{1,3}, it will be worthwhile to undertake studies on the ovarian lipid fractions after bilateral hysterectomy.

MATERIALS AND METHODS

Wistar strain healthy adult female albino rats (100 days old, 140 ± 5 g body wt) with regular sexual cycles were selected as the experimental material for the present study. The rats were examined for diestrus stage through vaginal smear technique¹⁰. The first group of six rats was subjected to bilateral hysterectomy during diestrus stage by conventional method through abdominal approach. The ovarian artery and vein were left intact to the ovary, but severed and ligated between the ovary and uterus. The uterus was excised at the level of the cervix and uterine artery and vein ligated. The second group of six rats was sham-operated during the same stage of the cycle and served as controls. After one month of hysterectomy the rats were killed by cervical dislocation and the ovary was isolated carefully, weighed and used for further biochemical assays. The total lipids¹¹, triglyce-

rides¹², lipase activity¹³, phospholipids¹⁴, free fatty acids¹², glycerol¹⁵ and cholesterol¹⁶ were estimated in control and hysterectomized rats.

RESULTS AND DISCUSSION

The data presented in table 1 indicate the lipid profiles of ovary of albino rats on bilateral hysterectomy. The normal tissue lipid values obtained in the present study were in conformity with those of previous investigators^{17,18}.

The observed decrease in ovarian lipid content of hysterectomized rats over the normal animals was indicative of either increased lipolysis and/or decreased lipogenesis. Hence lipase activity was determined in the tissue and found to be significantly elevated. Lipolysis of the tissue will be activated by corticosteroids¹⁹. Since the hysterectomy form a stress condition, hypophysial ACTH is released under such stress condition with spontaneous elevation in plasma corticosteroids and the corticosteroids activate the lipolysis¹⁹. The observed elevation in ovarian lipolysis after hysterectomy seems to be a stress reaction with involvement of chain-reactions from the hormones. The triglyceride content was markedly decreased with an elevation in lipase activity. This observation suggests the active mobilization of neutral fat, into the ovarian metabolism. Consequent on such an increase in the lipolysis, the glycerol content was elevated. But the free fatty acid content was depleted indicating the mobilization of these components into oxidative metabolism. Hence after hysterectomy the ovarian metabolism seems to be oriented towards lipid oxidations resulting in decreased triglycerides. Such lipid utilization property was associated with the ovary under inhibited oogenesis²⁰. The phospholipid content was considerably depleted indicating impaired tissue syn-

Table 1 Levels of total lipids, triglycerides, lipase activity, phospholipids, free fatty acids, glycerol and cholesterol in the ovary of control and hysterectomized rats.

Parameter	Control	Hysterec- tomized
Total lipids (mg/g wet wt)	84.52 ± 3.14	61.07* ± 2.20
		(-27.74)
Triglycerides (mg/g wet wt)	14.37 ± 0.78	9.78* ± 0.34
		(-31.94)
Lipase activity (μ mol PNPA cleaved/ mg protein/hr)	0.414 ± 0.02	0.597* ± 0.03
		(+44.20)
Phospholipids (mg/g wet wt)	28.32 ± 1.04	17.58* ± 0.80
		(-37.92)
Free fatty acids (mg/g wet wt)	22.12 ± 1.13	15.53* ± 0.76
		(-29.79)
Glycerol (mg/g wet wt)	1.62 ± 0.09	1.81* ± 0.09
		(+11.73)
Cholesterol (mg/g wet wt)	4.58 ± 0.46	6.32* ± 0.44
		(+37.99)

Each value is mean \pm S.D of 6 individual observations. Values in parentheses are per cent changes over control. * = Statistically significant ($P < 0.05$) over control.

thetic activity with suppressed active transport process. Since the phospholipids are associated with the ovarian structure, impaired structural integrity of ovary can be envisaged, in view of the decreased phospholipid content after hysterectomy.

The cholesterol content showed considerable accumulation over the control level suggesting either decreased mobilization and/or increased *de novo* synthesis. Since cholesterol mobilizes steroidogenesis in ovary⁹, its elevation was indicative of impaired sex steroid synthesis in the tissue after hysterectomy.

In general it can be concluded that an ovary with induced lipolysis is associated with hysterectomy, since the ovary with lipid utilization and carbohydrate sparing²¹ was non-functional. Further confirmatory studies in this direction are in progress.

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