

PLASMA ESTRADIOL AND LIPID PROFILE IN PERIMENOPAUSAL WOMEN

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Abstract : This study was conducted to examine the estradiol level and plasma lipid profile in perimenopausal women. The estradiol and HDL levels were higher and LDL levels lower in premenopausal women than in postmenopausal women of the same age group. Higher HDL and lower LDL levels in premenopausal women are likely to protect them against atherosclerosis, and the difference may be causally related to estradiol levels.

Key words : estradiol atherosclerosis LDL HDL cholesterol triglyceride
 hepatic lipase menopause premenopausal women postmenopausal women

INTRODUCTION

Atherosclerosis is less frequent in premenopausal women than in post menopausal women. Several investigators have attributed this difference to the characteristic changes in lipid metabolism at menopause giving rise to a lipoprotein profile which is considered to increase the risk of ischaemic heart disease (1,2).

Many workers have shown increased prevalence of coronary heart disease among women who had premature menopause or surgical menopause (3,4). In these women, plasma cholesterol levels and triglyceride levels are invariably increased after menopause (3,5,6). A decrease in HDL level in postmenopausal women may predispose them to increased atherosclerotic heart disease (1,7) besides an increase in LDL level (8).

This study was conducted to examine the change in lipoprotein profile after menopause when compared

to perimenopausal women of nearly the same age group.

METHODS

Forty healthy women (age 40-50 years, weight 40-60 kg) were selected from the general population, of which 20 were premenopausal and 20 were postmenopausal. Premenopausal women had regular periods of menstruation. Blood samples were taken between day 10 and 17 of the cycle. Postmenopausal women had amenorrhoea for a minimum period of 1 year without any irregular bleeding during that period.

After an overnight fast, 5 ml blood was collected by venipuncture and plasma was separated. The following were estimated :

- (a) Plasma Estradiol by Radio Immuno Assay kit (Diagnostic Products Corporation, Los Angeles).

- (b) Plasma lipid profile by enzymatic methods using kits (Boehringer Mannheim GmbH Diagnostica, Germany).

Lipid profile included Cholesterol, Triglyceride and High Density Lipoprotein Cholesterol (HDL)

Low Density Lipoprotein Cholesterol (LDL) level was determined by calculation using the formula,

$$\text{LDL (in mg/100 ml)} = \text{Total Cholesterol} - \frac{\text{Triglyceride}}{5} - \text{HDL}$$

RESULTS

Estradiol levels and the levels of various lipids both groups are given in Table I. The estradiol levels in postmenopausal women are lower than in premenopausal women ($P < 0.001$). Cholesterol and triglyceride levels in the two groups are not statistically significant. The HDL level is significantly lower and LDL level significantly higher in postmenopausal women than in premenopausal women.

TABLE I : Estradiol and serum lipids in premenopausal and postmenopausal women.

	Premenopausal women			Postmenopausal women		
	Range	Mean	SD	Range	Mean	SD
Estradiol (pg/ml)	110-516.8	226.32	114.16	4.5-53	21.73	12.48***
Cholesterol (mg/100 ml)	147-226	181.95	27.73	132-269	197.85	42.02 ^{NS}
Triglycerides (mg/100 ml)	53-202	117.9	47.17	68-254	150.85	73.19 ^{NS}
HDL Cholesterol (mg/100 ml)	58-77.5	58.97	11.77	35-59.5	46.9	11.49**
LDL Cholesterol (mg/100 ml)	42.1-133.9	98.64	27.85	76-157.7	120.78	38.03*

***, $P < 0.001$

** , $P < 0.01$

* , $P < 0.05$

NS, Not significant

DISCUSSION

Our findings are consistent with the findings of Paterson et al (9) who has compared cholesterol and triglyceride levels in pre and postmenopausal women and found them to be raised significantly in postmenopausal women. Varma (10) has shown

that cholesterol and triglyceride concentration decrease in postmenopausal women after exogenous estrogen administration. Sherwin et al (11) conducted a study on oophorectomised postmenopausal women with estrogen replacement. They found that on exogenous estrogen administration, cholesterol and LDL levels were reduced and HDL levels were increased.

Estrogen exerts its action on Hepatic Lipase also known as Heparin Releasable Hepatic Lipase (HRHL), to influence the metabolism of HDL. Hepatic Lipase is located on the luminal surface of the hepatic endothelial cells (12). Hepatic lipase binds to HDL₂ (13) and hydrolyzes the phospholipid in HDL₂ in preference to those in HDL₃ or LDL (14,15). It has been suggested that hepatic lipase is a relatively specific HDL₂ phospholipase and that it may act in the hepatic uptake of cholesterol and in the conversion of HDL₂ to HDL₃ (12, 16). HDL₃ accepts cholesterol from tissues and is converted to HDL₂ which is then internalised in the liver. Estrogen decreases the hepatic lipase activity and thereby increases the plasma HDL₂ level. The precise mechanism by which estrogens regulate the activity of hepatic lipase remains unknown. Probably they repress the synthesis of the enzyme protein or they could bind to the enzyme and cause conformational changes which decrease the enzyme activity (17,18).

Estrogen decreases the plasma LDL level, at least in rats by increasing its hepatic catabolism (19). Amount of LDL that enters the arterial wall decreases and foam cell formation rich in cholesterol esters is reduced.

The findings of the study are consistent with the protective role of estrogens against atherosclerosis in premenopausal women.

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