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Effect of hyperlipidemia in the atherosclerotic patients on sex hormones

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Abstract

The current study was designed to explain the relationship of testosterone and estradiol levels with the serum lipid profile alteration . It has included the measurement of serum testosterone and estradiol levels in healthy subjects (40 males and 43 post – menopausal females) , atherosclerotics male (40) and post – menopausal (41) atherosclerotic females . Serum triglyceride , cholesterol , HDL- cholesterol , LDL-cholesterol and VLDL- cholesterol were also estimated in those individuals . The results revealed significant ($p < 0.05$) elevation of serum estradiol level in atheroselerotic males when compared with those of the control group,Estradiol also was found decreased significantly ($p <0.05$) when testosterone levels indicated a significant ($p < 0.05$) in atherosclerotic post-menopausal female when compared with control group . The results identified the details of serum lipid profile changes in conditions of different levels of sex steroids .

Introduction

Initiatives seek to understand the relevance of sex steroids with the abnormalities of lipids and lipoprotines in details , this has been always the hope of biochemists . Hyperlipdimea is a serious medical problem worldwide . The frequent type of such abnormality is hyper cholesterolemia . It is the leading cause for development of ischeamic heart diseases (1) . Hyper triglyceridemia is less common , but it is also a

risky pathological condition . The consequences of this abnormality is pancratitis and steatosis (2) .

Sex steroids are a subset of sex hormones that produce sex differences or support reproduction . They include estrogens , progesterones , and androgens . The major male androgen is testosterone (3 , 4) .

In observational studies postmenopausal women using estrogen have been found to have a reduced risk of major clinical coronary disease and reduced cardiovascular disease mortality (5) . However , a large randomized clinical trial of estrogen replacement therapy for secondary prevention of coronary heart disease in post menopausal women failed to demonstrate a redeuced rate of coronary heart disease events (6) . Finally two studies examining the relation of estrogen replacement therapy to carotid atherosclerosis have yielded conflicting results (7 , 8) .

Materials and methods

- Patients and control group

Eighty one atherosclerotic patient who attended the Al-Hakeem Hospital in the Najaf were enrolled in this study .

They were 40 males (55 ± 10 y) , and 41 postmenopausal females (60 ± 5 y) .

The control groups consisted of age matched 83 individuals . They were , 40 males (44 ± 7.2 y) , and 43 postmenopausal females (60 ± 5.2 y) . Blood samples were taken from the fasting atients and control group at 9 AM .

Atherosclerosis cases and controls were chosen on the basis of their average carotid artery ultrasound measurements . A women was considered postmenopausal if she had not menstruated in the last two years .

Postmenopausal women were further classified as a having undergone surgical menopause if they had a bilateral oophorectomy . Natural menopause also described nonmenstruating women 55 years of age or older who had a hysterectomy and had at least one intact ovary (9).

- Blood samples

Disposable syringes and needles were used for blood collection . Blood samples were obtained from patients and the control group by vein puncture . Sample were allowed to clot at 37°C , and then centrifuged at 3000xg for 10 minutes . Serum were stored at -20°C until analysis of the hormone.

- Determination of serum estradiol and testosterons levels in patients and control groups

The principle assay combines and enzyme immunoassay competition method with a final detection (ELFA) .

Total cholesterol , triglyceride , and HDL- cholesterol was determined using commercially available kit (Bio Merieux-France) . LDL-cholesterol , and VLDL-cholesterol was calculated using the following formula that developed previously (10) , in which : TC = (HDL- cholesterol) + (VLDL- cholesterol) + (LDL-cholesterol) .

VLDL- triglycerides concentration was determined by dividing triglycerides value obtained on 2.2 (11) when triglycerides concentrations are given in mmol/L .

Biostatistical analysis

The results were expressed as mean ± SD . Students *t*-test was used for assessment of the results . Significant variation was considered when the P value was than 0.05 .

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Results and discussion

The estimation of serum estradiol , and testosterone concentrations revealed significant ($p < 0.05$) elevations of estradiol in atherosclerotic males when compared with those of control group . Serum testosterone didn't show significant variation during a comparable elevation (table 1) .

In postmenopausal females estradiol was found to decrease significantly ($p < 0.05$) in the atherosclerotic females when compared with those of control group , while testosterone level was demonstrate to increase significantly ($p < 0.05$) to those of control group (Table 2) .

In atherosclerotic patients , males and postmenopausal females , cholesterol , triglycerides, LDL , and VLDL were elevated significantly ($p < 0.001$) for triglyceride and VLDL and($p < 0.01$) for cholesterol and LDL-cholesterol) in comparison with those of the control group . HDL-cholesterol did't demonstrate significant change during a comparable evaluation (Table 3 , 4) .

Several studies have shown beneficial cardiovascular effects of exogenous estrogen , including lower body weight (12-14) . increased high density lipoprotein (HDL) cholesterol and decreased low density lipoprotein (LDL) cholesterol (12 , 14-16) levels , lower fasting insulin and glucose levels (10 , 14) , improved brachial artery blood flow (15) and regression of atherosclerotic plaques (16) .

Prior to menopause , women have a mush lower risk of cardiovascular disease compared with men of the same age (17) ; However , menopause initiates a phase of increased risk (18) . At the time of menopause compared with the premenopausal state , a women's endogenous hormonal milieu changes ; there is a relative estrogen deficiency and relative increase in testosterone levels .

A weaker form of estrogen , estrone , continues to be synthesized as a result of peripheral conversion from adrenal androstendione in the fat

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, liver and kidney (19) . Given what is known about the relation between estrogens , androgens and cardiovascular disease in women receiving estrogen replacement therapy , postmenopausal women with significant atherosclerosis and cardiovascular disease would be expected to have lower endogenous estrogen levels and higher endogenous androgen levels than those without significant atherosclerosis .

Studies examining the relation between endogenous postmenopausal hormone levels and cardiovascular disease have yielded conflicting results . Several studies have found no association between sex hormone levels and risk of death from cardiovascular disease (20-22) . However , two studies suggest a protective effect of higher androgen levels on cardiovascular disease in postmenopausal women (23 , 24) .

An interesting point is that all serum lipid profile parameters are significantly changes in the stated population accept HDL- cholesterol concentration . The reason seems to be unclear and not fully understated it needs further clarification . Several reports have stated alterations in the HDL- cholesterol subclasses but the total function still remained constant (25) .

Table (1). Serum estradiol and testosterone levels in control group and atherosclerotic males .

	Control group	Patients	P value
Estradiol	29.42 ± 19.37	39.17 ± 24.15	0.05
Testosterone	3.76 ± 1.89	3.70 ± 2.74	N.S.

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Table (2). Serum estradiol and testosterone levels in control group and atherosclerotic postmenopausal females .

	Control group	Patients	P value
Estradiol	25.91 ± 23.23	32.05 ± 30.72	0.05
Testosterone	0.55 ± 0.11	0.61 ± 0.60	0.05

Table 3. Serum lipid profile in control group and atherosclerotic males

	Control group	Patients	P value
Triglycerides	2.28 ± 1.14	4.82 ± 2.12	0.001
Cholesterol	5.22 ± 2.20	6.95 ± 2.28	0.01
HDL-cholesterol	0.97 ± 0.30	0.76 ± 0.64	N.S
LDL-cholesterol	3.63 ± 1.80	4.42 ± 2.22	0.01
VLDL-cholesterol	1.02 ± 0.46	2.05 ± 1.33	0.001

Table 4. Serum lipid profile in control group and atherosclerotic postmenopausal females

	Control group	Patients	P value
Triglycerides	1.55 ± 0.61	3.99 ± 1.89	0.001
Cholesterol	4.73 ± 1.78	7.74 ± 3.60	0.01
HDL-cholesterol	0.94 ± 0.35	0.85 ± 0.55	N.S
LDL-cholesterol	3.29 ± 1.70	4.86 ± 2.75	0.01
VLDL-cholesterol	0.71 ± 0.20	0.85 ± 0.80	0.001

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الخلاصة :

تم تصميم الدراسة الحالية لتوضيح من العلاقة بين مستويات كل من التستوستيرون والاسترادايول مع تغيرات الدهون المصلية . تضمن الدراسة تقديراً لمستويات التستوستيرون والاسترادايول في اشخاص اصحاء (40 رجل و43 امراءة بأعمار بعد انقطاع الطمث) . وذكور مصابين بتصلب الشرايين (40) واناث مصابات بتصلب الشرايين (41 باعمار بعد انقطاع الطمث) . فضلاً عن ذلك تم تقدير والكلسريدات الثلاثية HDL الكليسريدات الثلاثية المصلية للكولسترول والكولسترول في الاشخاص الاصحاء والمرضى . LDL- والكليسريدات الثلاثية VLDL-أظهرت الذتائج زيادة معنوية ($p < 0.05$) في مستوى الاسترادايول لدى الذكور المصابين بتصلب الشرايين عند مقارنتهم مع مجموعة السيطرة واظهر الاسترادايول نقصاً معنوياً ($p < 0.05$) لدى الاناث باعمار ما بعد انقطاع الطمث المصابات بتصلب الشرايين عند مقارنتهم مع مجموعة السيطرة . بينما اظهرت مستويات التستوستيرون زيادة معنوية ($p < 0.05$) عند المقارنة مع مجموعة السيطرة . كما أظهرت نتائج تقدير الدهون المصلية زيادة الدهون المختلطة لدى المصابين بتصلب الشرايين عند المقارنة ب مجموعة السيطرة . ان الذتائج قد بينت بالتفصيل تغيرات الدهون المصلية في مستويات مختلفة من الهرمونات الستيرويدية الجنسية .