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Effects of thyroid dysfunction on lipid profilein postmenopausal women

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Abstract
According to the American Association of Clinical Endocrinologists (AACE), millions of women with unresolved menopausal like symptoms, even those taking estrogen may be suffering from undiagnosed thyroid disease. Data was collected using a pretested proforma meeting the objectives of the study. Detailed history and necessary investigations were undertaken. The purpose of the study was explained to the patient and informed consent obtained. Minimum of 100 patients are selected randomly who fulfil the inclusion and exclusion criteria. 36% of the postmenopausal women had dyslipidemia. Remaining 64% did not have dyslipidemia. In our study, among 64 patients who did not have dyslipidemia, 8 patients had SH, 5 patients had hypothyroidism, 2 patients had thyrotoxicosis, rest were euthyroid. Among 36 patients with dyslipidemia, 14 patients had SH, 3 patients had hypothyroidism and rest 19 were euthyroid.

Keywords: Thyroid dysfunction, lipid profilein, postmenopausal women

Introduction
Menopause is the permanent cessation of menses, as a result of the irreversible loss of a number of ovarian functions, including ovulation and estrogen production. It is diagnosed retrospectively after twelve consecutive months of amenorrhoea. But transition is not sudden, it takes few years and this transition period is called climacteric or Perimenopause period. The median age for the onset of the climacteric transition is 47.5 years. The median age of menopause is 51 years [1].

Menopause results from loss of ovarian sensitivity to gonadotropin stimulation which is directly related to follicular decline and dysfunction. The oocytes in the ovaries undergo atresia throughout a woman's life and both the quantity and quality of follicles undergo a critical decline approximately 20-25 years after menarche [2]. Although fertility declines, pregnancy can still occur as demonstrated by a relatively high rate of unintended pregnancies in women 40-44 years age.

According to the American Association of Clinical Endocrinologists (AACE), millions of women with unresolved menopausal like symptoms, even those taking estrogen may be suffering from undiagnosed thyroid disease. While symptoms such as fatigue, depression, mood swings and sleep disturbance are frequently associated with menopause they may also be signs of hypothyroidism. A survey done by the AACE showed that only one in four women who have discussed menopause & its symptoms with a physician were also tested for thyroid disease [3].

The thyroid and menopause connection is complex. It actually stems from close interactions between thyroid hormones and reproductive organs because thyroid hormones regulate metabolism, they directly influence the activity of reproductive glands. In addition estrogen and progesterone directly affect thyroid uptake receptor sites by blocking or allowing them to function. Not only do the symptoms of an imbalance of thyroid hormones mirror many of those associated with fluctuating levels of estrogen and progesterone, but the two conditions may be involved in the causal relationship [4]. Synthetic hormone use during HRT (Hormone replacement therapy) interact with and affect the functioning of the thyroid as well.

Thyroid dysfunction results in changes in the composition and transport of lipoprotein. Overt and subclinical hypothyroidism is associated with hypercholesterolemia mainly due to elevation of LDL cholesterol, whereas HDL cholesterol is normal or elevated. Hyperthyroidism (both overt and subclinical) is accompanied by decrease in serum levels of

total LDL and HDL cholesterol. These changes in lipid profile are explained by the regulatory effects of thyroid hormones on the activity of some key enzymes of lipoprotein metabolism [5, 6].

Methodology

Source of Data

Postmenopausal women who fulfil the inclusion and exclusion criteria as mentioned below, attending the outpatient and inpatient of Medicine.

Type of Study

Hospital based Cross sectional study

Period of study

One year study period

Method of Collection of Data

Data was collected using a pretested proforma meeting the objectives of the study. Detailed history and necessary investigations were undertaken. The purpose of the study was explained to the patient and informed consent obtained. Minimum of 100 patients are selected randomly who fulfil the inclusion and exclusion criteria. Relevant history including symptoms and signs at presentation, past medical history, menstrual history, drug history and examination findings was be noted.

Investigations

Routine Investigations

- Complete blood count
- Blood urea
- Serum creatinine
- Urine analysis
- FBS, PPBS
- ECG
- Chest X ray PA view
- USG abdomen pelvis

Special investigations

- Thyroid profile – TSH, Total T4.
- Lipid profile – Total cholesterol, Triglycerides, LDL cholesterol, HDL cholesterol.

Results

Table 1: Prevalence of dyslipidemia

Dyslipidemia	Number (n=100)	Percentage
Present	36	36%
Absent	64	64%

36% of the postmenopausal women had dyslipidemia. Remaining 64% did not have dyslipidemia.

Table 2: Correlation of Thyroid dysfunction of patients and Dyslipidemia

Dyslipidemia	Total no. Of patients	Thyroid dysfunction			
		Normal	SH	Hypo	Thyrotoxi-cosis
Absent	64	49(76.6%)	8(12.5%)	5(7.8%)	2(3.1%)
Present	36	19(52.8%)	14(38.9%)	3(8.3%)	0(0%)
Total	100	68(68%)	22(22%)	8(8%)	2(2%)
Inference	Dyslipidemia is significantly associated with thyroid dysfunction with P=0.04*(2x4 fisher exact test)				

In our study, among 64 patients who did not have dyslipidemia, 8 patients had SH, 5 patients had hypothyroidism, 2 patients had thyrotoxicosis, rest were euthyroid. Among 36 patients with dyslipidemia, 14 patients had SH, 3 patients had hypothyroidism and rest 19 were euthyroid.

Dyslipidemia is significantly associated with thyroid dysfunction with P=0.04*(2x4 fisher exact test)

Table 3: Correlation of thyroid dysfunction of patients and Pattern of Dyslipidemia

Pattern of Dyslipidemia	Total number of patients	Euthyroid	SH	Hypo	Thyrotoxic
Hypercholesterolemia	36	19 (52.77%)	14 (38.88%)	3 (8.33%)	0
Hypertriglyceridemia with hypercholesterolemia	5	0	4 (80.00%)	1 (20.00%)	0
Increased LDL with hypercholesterolemia	7	5 (71.42%)	0	2 (28.57%)	0
Low HDL with hypercholesterolemia	3	2 (66.66%)	0	1 (33.33%)	0

All patients with dyslipidemia, i.e 36 patients were found to have increased TC, of these 5 had increased TG, 7 had increased LDL, 3 had low HDL. In these 36 patients with dyslipidemia 19(52.77%) were euthyroid, 14(38.88%) were subclinically hypothyroid, 3(8.33%) were clinically hypothyroid. Dyslipidemia was not found in thyrotoxic patients. Predominant pattern of dyslipidemia seen in patients with thyroid dysfunction was hypercholesterolemia.

Discussion

In our study, 36% of patients had dyslipidemia. 38.9% of patients with subclinical hypothyroidism & 8.3% of clinical hypothyroid patients were found to have dyslipidemia. Presence of dyslipidemia was statistically associated with thyroid dysfunction with p = 0.014. Predominant pattern of dyslipidemia seen was hypercholesterolemia. EPIC – Norfolk prospective study found significantly increased concentration of serum total cholesterol (TC), LDL cholesterol (LDLc) and triglycerides in SH women. Similarly in a large cross sectional study an increase of 1.0 mIU/L in serum TSH was associated with an average rise in TC values of 0.09 mmol/L in women. In the latter study the impact of TSH elevation was substantially influenced by age, thus the effect of SH on the serum lipid profile appears more pronounced in women and is also worse with increasing age. Meier *et al.* [7] reported a reduction of Serum TC by 0.29 mmol/L of LDLc by 0.33mmol/L after 12 months of L-thyroxine replacement. However the effect was most pronounced in patients with baseline serum TSH values >12mIU/L. similarly Caracio *et al.* [8] reported mean

reductions in serum TC & LDLc concentrations of 0.47 & 0.41 mmol/L, respectively in a strictly selected group of patients with Hashimoto's thyroiditis & slightly elevated serum TSH level (<10mIU/L). In a subsequent randomised controlled study from the same group L-thyroxine replacement induced a significant improvement of both the lipoprotein profile and the carotid artery intima-media thickness: a widely recognised surrogate index of early atherosclerosis & CV events. A large meta-analysis in which individual data on more than 50,000 participants from 11 prospective cohorts were collected, demonstrated that CHD mortality was increased in participants with serum TSH >7 mIU/L & that the risk of CHD events was significantly increased once serum TSH >10mIU/L [9]. A recent observations analysis of 4500 SH patients from United Kingdom General Practitioner Research Database demonstrated that patients <70yrs who were started on L-thyroxine had lower CHD events over 8 years of follow up [10]. This suggests that L-thyroxine treatment of SCH is safe and the results are consistent with a modest prognostic benefit from such therapy.

Conclusion

In our study, dyslipidemia was significantly associated with thyroid dysfunction with predominant pattern being hypercholesterolemia.

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