

# Research Journal of Pharmaceutical, Biological and Chemical Sciences

## Effect of Thyroxin Therapy on Lipid Profile in Dyslipidemia in Subclinical Hypothyroidism.

Kaviprasanna S\*, Saikumar P and Alaguveni T.

Department of Physiology, Sree Balaji Medical College and Hospital, Bharath University, Chennai, Tamil Nadu, India.

### ABSTRACT

This study was done to show that achieving euthyroid status with thyroxine replacement therapy has a favourable effect on lipid profile. This study was done on a total of 100 subjects. Among them 54 were patients with subclinical hypothyroidism who were compared to 56 controls. Their thyroid profile and lipid profiles were estimated. Thyroxine was replaced and they were followed up after a period of 3 months with a repeat lipid profile. It was found that their total cholesterol, LDL, VLDL and TGL levels were significantly decreased. There was a significant increase in mean HDL levels.

**Keywords:** Subclinical Hypothyroidism, Dyslipidemia, Thyroxine.

*\*Corresponding author*

## INTRODUCTION

Subclinical hypothyroidism is shown to create some changes in lipid profile also. Thyroxin substitution therapy will cause changes in lipid profile of those individuals with subclinical hypothyroidism. Sub clinical hypothyroidism has a prevalence between 4.5%-10% in various studies [1]. Studies done on North Indian population showed a significant increase in VLDL, LDL and HDL and triglycerides noted in subclinical hypothyroidism compared to euthyroid individuals [2]. Significant elevation in Total cholesterol, TGL and LDL was seen in anti TPO (Anti thyroperoxidase ) positive cases compared to anti TPO negative cases [3]. The burden of subclinical hypothyroidism is higher in iodine sufficient areas compared to the iodine deficient areas. Studies have shown results in degree of lipid changes and also effect of thyroxin replacement [4]. The decline in serum cholesterol was found to be directly proportional to its baseline value in those patients with subclinical hypothyroidism [5].

### Aim and Objectives

To assess the abnormality in lipid profile in sub clinical hypothyroidism and to assess the effect of thyroxin replacement therapy on lipid profile

## MATERIAL AND METHODS

A total of 100 individuals were recruited. Of these 54 were detected to have subclinical hypothyroidism, the other 56 were healthy controls. Their fasting TSH, free T3, free T4, and anti TPO antibodies, total cholesterol, HDL cholesterol, LDL cholesterol, VLDL cholesterol, serum triglycerides were measured. Thyroxine treatment was given for selected patients. Among them 21 patients were followed up after three months with a repeat lipid profile.

## RESULTS

The mean TSH in cases with subclinical hypothyroidism was significantly higher than in control group i.e, 9.41mIU/ml against 2.92mIU/ml in cases. The *P* value < 0.001.

The mean T4 was significantly lower in cases i.e, 0.98ng/dl, when compared to controls i.e, 1.22ng/dl. The *P* value = 0.001. There was no significant difference in mean free T3 levels of two groups i.e, 2.97pg/ml and 2.90pg/ml in cases and controls respectively. The *p* value =0.509.

Anti TPO antibody levels > 50 IU/ml was found in 27 people with subclinical hypothyroidism i.e, 50% compared with control group which had 8 subjects with Anti TPO levels > 50IU/ml i.e, 14.29%. The mean BMI was  $21.56 \pm 2.81\text{kg/m}^2$ . Mean BMI in control group was  $21.37 \pm 1.52\text{kg/m}^2$ . There was no significant difference in mean BMI of the two groups. (*P* value = 0.776).

In subclinical hypothyroids the mean total cholesterol level was 171.90mg/dl compared to 151.50 mg/dl in controls. (*P* value = 0.004). There was no statistical significance in the mean HDL levels in patients with subclinical hypothyroidism compared to controls. The values are 39.04mg/dl and 41.46mg/dl respectively.

The mean LDL levels were significantly higher in cases i.e, 104.89mg/dl compared to 79.4mg/dl in controls. (*P* value < 0.001). The VLDL levels had no significant change i.e, 33.00mg/dl and 27.92mg/dl in cases & controls respectively. (*P* value = 0.112). The triglyceride levels were 164.60mg/dl and 142.36mg/dl in cases & controls respectively showing no significant statistical differences. (*P* value = 0.063).

Among the 21 subjects who were followed-up after treatment with thyroxine at the end of three months, fasting thyroid and lipid profile were taken. (This was done after achieving euthyroid status with incremental doses of thyroxine replacement)

The mean dose of thyroxine was used  $46.90 \pm 16.01\mu\text{g}$ . The mean TSH showed a significant decrease after treatment i.e,  $12.01 \pm 6.50\text{mIU/ml}$  against  $3.20 \pm 1.65\text{mIU/ml}$ . The *P* value < 0.001. The pre and post treatment T3 values showed no significant difference. The free T4 levels after treatment were  $0.96 \pm 0.21\text{ng/dl}$  against  $1.02 \pm 0.22\text{ng/dl}$ . (*P* value = 0.011).

A significant decrease in total cholesterol from pre-treatment mean levels of 171.90mg/dl to 160.70mg/dl ( $P$  value = 0.003). A mild increase in HDL levels from a mean pre-treatment of 39.04mg/dl to 42.60mg/dl. However it was not statistically significant. ( $P$  value = 0.220). A significant decrease in mean LDL levels from 104.89mg/dl to 89.03mg/dl was noted. ( $P$  value = 0.002). There was a significant decrease from 33mg/dl to 28.04mg/dl ( $P$  value = 0.008). In VLDL levels there was a significant decrease in mean triglyceride levels from pre-treatment value of 164.60mg/dl to 143.50mg/dl ( $P$  value =0.014).

**TABLE {1} COMPARISON OF THYROID PROFILE & BMI AMONG NORMAL INDIVIDUALS & SUB CLINICAL HYPOTHYROIDISM**

PARAMETERS	CASES n=56	CONTROLS n=54	P-VALUE
MEAN TSH	9.49 mIU/ml	2.91 mIU/ml	<0.001
MEAN FREE T3	2.96 pg/ml	2.87 pg/ml	0.509
MEAN T4	0.99 ng/dl	1.23 ng/dl	0.001
BMI	21.48 ± 2.80 kg/m <sup>2</sup>	21.36 ± 1.53 kg/m <sup>2</sup>	0.776

**TABLE {2} COMPARISON OF LIPID PROFILE AMONG NORMAL INDIVIDUALS & SUBCLINICAL HYPOTHYROIDISM**

PARAMETERS	CASES	CONTROLS	P-VALUE
TOTAL CHOLESTEROL	173.72 mg/dl	150.77 mg/dl	0.004
MEAN HDL	38.63 mg/dl	42 mg/dl	
LDL	106.07 mg/dl	80 mg/dl	<0.001
VLDL	32.98 mg/dl	28.73 mg/dl	0.112
TGL	165.01 mg/dl	140.57 mg/dl	0.063

**TABLE {3} COMPARISON OF LIPID PROFILE BEFORE & AFTER TREATMENT IN CASES WITH SUBCLINICAL HYPOTHYROIDISM**

LIPID PARAMETERS	BEFORE TREATMENT	AFTER TREATMENT	P-VALUE
TOTAL CHOLESTEROL	175.48 mg/dl	161.86mg/dl	0.003
HDL	41.14 mg/dl	43.43 mg/dl	0.220
MEAN LDL	102.19 mg/dl	88.37 mg/dl	0.002
MEAN VLDL	32.14 mg/dl	27.91	0.008
TGL	161.57 mg/dl	140.28	0.014

## DISCUSSION

According to Canaris GJ, Manowitz NR, Mayor G, Rigway EC who did the Colorado disease prevalence study where 25,862 subjects were screened the mean total cholesterol and LDL levels were found to increase with increasing levels of serum TSH levels. The lipid levels increased in a graded fashion as the thyroid function decreased [1].

In another study done by Kuldip Singh, Saranpal Singh on 100 patients of age group between 15-65 years with subclinical hypothyroidism significant increase in triglycerides and VLDL, HDL and LDL levels were observed in subclinical hypothyroid patients compared to Euthyroid individuals. There was no significant statistical difference in any of the lipid fraction levels with change in the severity of subclinical hypothyroidism [2].

Bandyopadhyay SK, Basu AK, Pal SK, Roy P, Chakrabarty S, Pathak HS did a study on 100 patients with subclinical hypothyroidism. Among them 52 were euthyroid controls. The Serum lipoprotein levels above the age of twenty years and total cholesterol, LDL and triglycerides in age group of 40-50 years were significantly elevated. Also the total cholesterol, triglycerides and LDL was elevated in anti TPO (Antithyroperoxidase) positive cases. Only the triglycerides and LDL were elevated in anti TPO negative cases [3].

Whether replacement therapy with thyroxine lowers the serum lipid levels in patients with subclinical hypothyroidism is not yet well established.

Tanis BC, Westendorp GJ, Smelt HM found that subclinical hypothyroidism is two to three times more frequent in people with an elevated plasma cholesterol. Total plasma cholesterol levels were slightly elevated in patients with subclinical dysfunction of thyroid. Thyroid substitution therapy in patients with subclinical hypothyroidism restoring the TSH levels to normal decreases the total cholesterol by 0.4 mmol independent of the initial plasma level [4].

Danese MD, Ladenson PW, Meinert CL, Powe NR have done meta-analysis in two different studies regarding effects of thyroxine on serum cholesterol levels in patients with mild thyroid failure [5]. Factors like age, sex, race, pre-treatment lipid values etc. determine the variable changes in the various lipid parameters. There is a substantial reduction in cardiovascular morbidity with even small reductions in level of total Cholesterol, LDL and triglycerides. It was also found that the reduction in serum total cholesterol is larger in individuals with higher pretreatment cholesterol levels and in hypothyroid individuals taking sub optimal T4 doses. There does not seem to be significant effects of T4 on serum HDL and triglycerides.

The importance of studies investigating the effects of thyroxine on lipid profile is due to the fact that the prevalence of subclinical hypothyroidism in India is on the increase. Also subclinical hypothyroidism is more frequent in areas of iodine sufficiency than in iodine deficient areas. The burden of subclinical hypothyroidism is also expected to increase in countries like India.

## REFERENCES

- [1] Canaris GJ, Manowitz NR, Mayor G, Ridgway EC. Arch Intern Med 2000;160:526-34.
- [2] Kuldip Singh, Saranpal Singh. Indian Fund Appl Life Sci 2011;1:127-32.
- [3] Bandhopadhyay SK, Basu AK, Pal SK, Roy P, Chakrabarti S and Pathak HS. J Indian Medical Assoc 2006;104:622-4,626
- [4] Tanis BC, Westendorp GJ and Smelt HM. Clin Endocrinol 1996;44:643-9.
- [5] Danese MD, Ladenson PW, Meinert CL and Powe NR. J Clin Endocrinol Metab 2000; 85:2993-3001.