



## A STUDY OF PREVALENCE OF THYROID DYSFUNCTION IN PATIENTS WITH METABOLIC SYNDROME

### General Medicine

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### ABSTRACT

**Introduction :** Metabolic syndrome is generally characterized as a clustering of the abnormal levels of blood lipids (low High Density Lipoprotein (HDL) and high triglycerides), impaired fasting glucose, elevated blood pressure and excess abdominal obesity.

**Objectives :** To study the prevalence and type of thyroid dysfunction in a diagnosed case of metabolic syndrome.

**Material And Method:** A complete physical and systemic examination was performed including CBC, RFT, Blood Glucose profile, Thyroid examination, complete urine. X-ray chest, USG-KUB, 2D-echo was performed in all cases.

**Results:** The percentage of sub clinical hypothyroid was 21% and overt hypothyroid was 9%. Subclinical hypothyroidism and overt hypothyroidism were present in 26.66% and 11.66% of females and in 12% and 5% of males respectively. None of the patient had subclinical or overt hyperthyroidism.

**Conclusion :** It can be concluded from the present study that sub clinical hypothyroidism and overt hypothyroidism is significantly associated with metabolic syndrome, especially females with metabolic syndrome have a higher prevalence of thyroid dysfunction which predisposes them to cardiovascular events. Therefore, we recommend the routine screening of the thyroid function in females with metabolic syndrome.

### KEYWORDS

#### INTRODUCTION

Metabolic syndrome is generally characterized as a clustering of the abnormal levels of blood lipids (low High Density Lipoprotein (HDL) and high triglycerides), impaired fasting glucose, elevated blood pressure and excess abdominal obesity<sup>1</sup>.

Obesity, insulin resistance, physical inactivity, advanced age and hormonal imbalance have been suggested as the underlying risk factors for the development of this syndrome<sup>2</sup>.

Metabolic syndrome affects approximately one quarter of the population in developed countries. People with metabolic syndrome are at an increased risk of atherosclerotic cardiovascular disease and type 2 diabetes<sup>3</sup>.

Several studies have reported that higher thyroid stimulating hormone (TSH) concentrations are associated with a higher likelihood for the occurrence of metabolic syndrome.

Additionally, thyroid disease, especially overt hypothyroidism, is associated with atherosclerotic cardiovascular disease. Since metabolic syndrome and thyroid dysfunction are independent risk factors of atherosclerotic cardiovascular disease (CVD), the concurrent existence of the two will substantially increase the risk of CVD. Several studies have shown a significant association which links metabolic syndrome with subclinical and overt hypothyroidism and the association seen metabolic syndrome to be more in females. Uzunlulu et al<sup>4</sup> reported that the prevalence of subclinical hypothyroidism was more in females with metabolic syndrome.

#### AIMS AND OBJECTIVES

To study the prevalence and type of thyroid dysfunction in a diagnosed case of metabolic syndrome.

#### MATERIAL AND METHOD

This observational and non-interventional study was carried out at a tertiary care centre from June 2018 to December 2018. 100 metabolic syndrome patients, attending OPD and admitted in medicine ward during study period, constituted the study group. Subjects were screened with the following inclusion/exclusion criteria.

#### INCLUSION CRITERIA:

- Patients attending medical OPD and admitted in medical ward of our institute and fulfilling the criteria of NCEP-ATP III guideline for diagnosis of metabolic syndrome

Waist circumference	>102 cms syndrome in men, >88 cms in women
Blood pressure	> 130/85 mm Hg

Fasting plasma glucose	>110 mg/dl
Triglyceride	>150 mg/dl
HDL cholesterol	< 40 mg in men, < 50 mg in women

#### EXCLUSION CRITERIA:

- Critically ill patients
- Pregnant women
- Patients with Drug induced thyroid dysfunction
- Patients with Thyroid malignancy

#### METHODOLOGY:

A detailed medical history of patient including symptoms, past illness, occupation, family illness, habits, and other co-morbid illness obtained.

A complete physical and systemic examination was performed including CBC, RFT, Blood Glucose profile, Thyroid examination, complete urine. X-ray chest, USG-KUB, 2D-echo was performed in all cases.

Blood pressure was measured over the right arm with the patient lying supine. Three readings were taken and a mean value of the 3 readings was taken as the final.

Fasting blood samples were obtained (venous blood samples taken after overnight fasting of a minimum of 8 hrs); glucose, total cholesterol, HDL and triglyceride levels were determined. LDL was calculated using Friedwald formula.

Serum TSH and FT4 measurements were made using Roche elecsys modular analytics E-170 using electrochemical luminescence immuno assay (ECLIA method). The sensitivity of TSH was 0.005  $\mu$ IU/ml and for FT4 was 0.023 ng/dl. Normal range for TSH was (0.27-4.2)  $\mu$ IU/ml and for FT4 was (0.93-1.7) ng/dl. A high serum TSH level (range between 4.2  $\mu$ IU/ml to 10  $\mu$ IU/ml) and a normal free thyroxin (FT4) level were required for the diagnosis of sub-clinical hypothyroidism (SCH). Patients with high TSH (>10  $\mu$ IU/ml) and low FT4 levels (< 0.93 ng/dl) were classified as being overt hypothyroid. Patients with normal TSH and FT4 were considered euthyroid.

#### RESULTS AND DISCUSSION

##### Comparison with various studies :

Parameters	Our study	Uzunlulu <sup>4</sup> study	Ghanshyam P <sup>6</sup>
Age	57.63 $\pm$ 10.58	48.5 $\pm$ 11.3	51 $\pm$ 9.4
Sex (M:F)	40:60	53:167	180:240

Waist (cm)	Male	101.43 ± 7.93	98.9 ± 9.6	100.1 ± 5.72
	Female	89.93 ± 9.04		
Blood pressure		146.06/90.4	145.6/91.7	140.8/90.7
FBS		133.71 ± 26.21	107.3 ± 11.7	109.8 ± 12.8
T. Cholesterol		233.45 ± 49.76	213.7 ± 47.2	225.9 ± 26.7
S. Triglyceride		167.43 ± 2053	199.4 ± 100.7	174.7 ± 58.9
S. HDL (mg%)	Male	37.18 ± 8.10	44.9 ± 10.7	40.2 ± 8.9
	Female	39.18 ± 7.0		

Mean age of our study was comparable with both the Ghanshyam et al and Uzunlulu et al study and male to female ratio (40%:60%) were more comparable with Ghanshyam et al study (45% : 55%), then Uzunlulu et al study (26% : 74%). Observations for hypertension and dyslipidemia were comparable with both above mentioned studies. As our study was carried out in a tertiary care center, mean fasting plasma glucose were higher than both above mentioned community based studies. In our study, the females in the 40-60 year age group had a higher incidence of thyroid dysfunction as compared to the other age groups, as most of the subjects in this group were having more risk factors like tobacco, sedentary life style etc. Our results were comparable with those of the above mentioned study. The incidence of thyroid dysfunction was more in patients with more than three components of the metabolic syndrome. The mean waist circumference which was noted in females with metabolic syndrome and thyroid dysfunction was 37.81 inches as compared to 37.50 inches in euthyroid females with metabolic syndrome. Uzunlulu et al & Ghanshyam et al also noted a higher mean waist circumference in patients with metabolic syndrome and subclinical hypothyroidism. In our study, among the components of the metabolic syndrome, women with a waist circumference >35 inches (88 centimeters) had a higher incidence of thyroid hypofunction.

**Table 2: Prevalence of Thyroid dysfunction**

Gender	Euthyroid	Sub-clinical hypothyroid	Overt hypothyroid	Sub-clinical hyperthyroid	Overt hyperthyroid
Male	33	5	2	0	0
Female	37	16	7	0	0
Total	70	21	9	0	0

In our study the percentage of sub clinical hypothyroid was 21% and overt hypothyroid was 9%, which were comparable with 43% and 15% in R V Jaykumar<sup>5</sup> study, 21.9% and 7.4% in Ghanshyam P<sup>5</sup> study and 16.36% of sub clinical hypothyroid in Uzunlulu<sup>4</sup> study.

Our study revealed that the prevalence of thyroid dysfunction was more among the females with metabolic syndrome. Subclinical hypothyroidism and overt hypothyroidism were present in 26.66% and 11.66% of females and in 12% and 5% of males respectively. None of the patient had subclinical or overt hyperthyroidism.

This indicates a possible interplay between the thyroid status and insulin sensitivity. The main pathophysiological basis underlying the metabolic syndrome has been attributed to insulin resistance. Insulin resistance is a cardinal feature of type 2 diabetes mellitus and an increased risk of dyslipidemia along with relatively frequently found mild thyroid dysfunction. Insulin resistance leads to an increased production of hepatic cholesterol and very low density lipoproteins (VLDL) and an increased HDL cholesterol (HDL-C) clearance<sup>7</sup>. Bakker et al<sup>8</sup> suggested that insulin resistance augments the deleterious effect of hypothyroidism on the lipid profile.

Several studies have proved the association between insulin resistance and hypothyroidism for overt hypothyroidism, but the association between insulin resistance be subclinical hypothyroidism remains unclear. It is known that overt hypothyroidism to an increase in the plasma cholesterol levels as proven by the HUNT study<sup>9</sup> also seen in our study.

In patients with overt hypothyroidism, there is an increase in serum total Cholesterol, low-density lipoprotein (LDL) cholesterol, apo B, lipoprotein (a) [Lp(a)] levels and possibly, triglyceride levels<sup>10</sup>. Normally, thyroid hormones increase the expression of the cell surface LDL receptors, thus leading to LDL clearance from the serum. In hypothyroidism, the depletion of the thyroid hormones leads to a reduced number of LDL receptors in the liver, thereby decreasing the biliary excretion of cholesterol thus resulting in elevated serum LDL and VLDL levels. It also eases the lipoprotein lipase activity and causes hypertriglyceridemia.

## CONCLUSION

It can be concluded from the present study that sub clinical hypothyroidism and overt hypothyroidism is significantly associated with metabolic syndrome, especially females with metabolic syndrome have a higher prevalence of thyroid dysfunction which predisposes them to cardiovascular events. Therefore, we recommend the routine screening of the thyroid function in females with metabolic syndrome.

So we can say that in future performing thyroid function test specifically S.TSH would be the routine and necessary test in patients with metabolic syndrome especially female patients, to diagnose and treat subclinical and overt thyroid dysfunction early and reducing the cardiovascular risk significant.

## REFERENCES

1. Church TS. Metabolic syndrome and Diabetes, Alone and in Combination, as predictors of cardiovascular disease mortality among Men. *Diabetes Care*, 2009; 32(7): 1289-1294.
2. Grundy S M. Diagnosis and Management of the Metabolic Syndrome; An American Heart Association/National Heart, Lung, and Blood Institute Scientific Statement, 2005; 112: 2735-2752.
3. Tkac I. Metabolic syndrome in relationship to type 2 diabetes and atherosclerosis. *Diabetes Res Clin Pract*, 2005; 68(suppl): S2-9.
4. Uzunlulu M, Yorulmaz E, Oguz A. Prevalence of subclinical hypothyroidism in patients with metabolic syndrome. *Endocr J*, 2007; 54: 71-76.
5. Jayakumar RV, Nisha B, Unnikrishnan AG, Nair V, Kumar H. Thyroid status in metabolic syndrome - a clinical study. *Thyroid Research and Practice*, 2010; 366-370.
6. Ghanshyam Palamaner Subash Shantha, Anita A Kumar, Vijay Jeyachandran, Deepan Rajamanickam, K Rajkumar, Shihas Salim, Kuyilan Karai Subramanian and Senthilkumar Natesan. Department of General Medicine, Sri Ramachandra University, Chennai, India. Association between primary hypothyroidism and metabolic syndrome and the role of C reactive protein: a cross-sectional study from South India. *Thyroid Research* 2009; 2:2 doi:10.1186/1756-661422.
7. Elisabeth HA, Huibert AP P, Visser JT, Drexhage HA, Hofman A and Jacqueline CVW. Subclinical Hypothyroidism Is an Independent Risk Factor for Atherosclerosis and Myocardial Infarction in Elderly Women: The Rotterdam Study. *Annals of Internal Medicine*, 2000; 132(4):270-278.
8. Bakker SJL, Maaten JC T, Popp-Snijders C, Slaets JPI, Heine RJ, Gans ROB. The relationship between thyrotropin and low density lipoprotein cholesterol is modified by insulin sensitivity in healthy euthyroid subjects. *J Clin Endocrinol Metab*, 2001; 86: 1206-11.
9. Bjorn O A, Svold, Lars J Vatten, Tom IL, Nilsen and Trine Bjoro. The association between TSH within the reference range and serum lipid concentrations in a population-based study. The HUNT Study. *European Journal of Endocrinology* (2007); 156: 181-186.
10. Elizabeth NP. Hypothyroidism and dyslipidaemia: Modern concepts and approaches. *Current Cardiology Reports*, 2004; 6(6): 451-456, DOI: 10.1007/s11886-004-0054-3.