



PREVALENCE OF SUB-CLINICAL AND CLINICAL HYPOTHYROIDISM IN PATIENTS WITH METABOLIC SYNDROME

Dr. P. Shakuntala

Associate Professor of Medicine, Government Medical College / General Hospital, Nizamabad, Telangana, India.

Dr. E. Ramya*

Postgraduate, M.D. General Medicine, Government Medical College / General Hospital, Nizamabad, Telangana, India. *Corresponding Author

ABSTRACT

Metabolic syndrome is a multifactorial disorder associated with development of cardiovascular, neurological, immunological, renal and endocrine disease. Metabolic Syndrome is rapidly becoming the primary cause for morbidity and mortality in the industrialized world surpassing infection, trauma and smoking related disorders.

Aims & Objectives

To study prevalence of thyroid dysfunction in patients with metabolic syndrome and to emphasize the need of thyroid function test in patients with metabolic syndrome whether necessary or not.

Material & Methods

Current study in the prevalence subclinical hypothyroidism and clinical hypothyroidism in patients with metabolic syndrome in Government General Hospital, Nizamabad, Telangana was conducted over a period of ten months.

Results

Fifty metabolic syndrome patients attending Hypertension Clinic, Diabetology Outpatient and General Medicine Outpatient were randomly screened. Out of 50 cases, the same population consists of 25 males and 25 females.

Conclusion

Since our study shows significant proportion of patient with metabolic syndrome had thyroid dysfunction and clinical manifestation like hypertension, abnormal lipid profile and obesity coexist in both, it is mandatory to screen thyroid function for patients with metabolic syndrome.

KEYWORDS : Sub-Clinical And Clinical Hypothyroidism, Metabolic Syndrome

INTRODUCTION

The guidelines issued by Adult Treatment Panel III (ATP-III) of National Cholesterol Education Program (NCEP) is simpler to use and has a higher predictive value than the guidelines issued by WHO is used in our study. The NCEP ATP III used to diagnose Metabolic Syndrome if three out of five of the following criteria are met1.

1. Waist circumference > 102 cm for males, > 88 cm for females
2. Blood pressure \geq 130/85 mm Hg
3. Fasting blood glucose \geq 110 mg/dl
4. HDL < 40 mg/dl for males; < 50 mg/dl for females
5. Plasma triglycerides \geq 150 mg/dl

In India current data shows, the prevalence of metabolic syndrome in Indian population is about 40%, much higher than 25% quoted for western population. The southern Indian urban population has highest prevalence rates for metabolic syndrome due to genetic predisposition and the tendency to have higher amounts of abdominal fat for a given body mass index^{2,3}.

Hypothyroidism is a clinical syndrome caused by decreased level of thyroid hormones. It can be primary in which there is intrinsic disorder of thyroid gland which is most common or it may be secondary to pituitary or hypothalamic effects⁴

The normal TSH level rules out primary hypothyroidism but not secondary hypothyroidism. In presence of raised TSH, a low free thyroid hormone level is necessary to confirm hypothyroidism⁵.

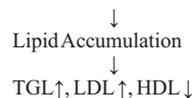
Hence free T3 level remains within normal range and is not an useful index of thyroid function in hypothyroidism and it should not be requested. Both T4 and T3 are bound to plasma proteins like thyroxine binding globulin, transthyretin and albumin⁶.

A number of inherited and acquired abnormalities affect thyroid hormone binding proteins and causes alterations of total T3 and T4 levels. Hence our study uses only free thyroxin level and thyroid stimulating hormones for assessing thyroid function⁷.

Link between Hypothyroidism and Metabolic syndrome

LIPID METABOLISM

Hypothyroidism \downarrow BMR



Borch-Johnsen K reports in his article "The metabolic syndrome in a global perspective" that the prevalence of the metabolic syndrome and also of its individual components worldwide has been steadily increasing. The article also predicts that by 2025 AD, it is likely that three out of four persons with the individual syndrome may found in one third world countries including South Asia⁸.

AIM OF THE STUDY

1. To screen patients with DM/ SHT / obesity for features of metabolic syndrome as per NCEP ATP III guidelines.
2. To study prevalence of thyroid dysfunction in patients with metabolic syndrome
3. To emphasize the need of thyroid function test in patients with metabolic syndrome whether necessary or not

MATERIALS & METHODS

With the aim of studying the prevalence subclinical hypothyroidism and clinical hypothyroidism in patients with metabolic syndrome in Government General Hospital, Nizamabad conducted over a period of ten months.

Fasting Blood Glucose

The blood sample for fasting blood glucose was taken after an overnight fast of atleast 8 hours and send to biochemistry lab.

Lipid Profile

The blood sample for lipid profile was taken after an overnight fast of twelve hour fast and sent to lab for test to be done using autoanalyser using standard procedures.

Estimation of Thyroid Function Test

Thyroid stimulating hormone (TSH)

- TSH is the single most parameter to screen hypothyroidism but a normal
- TSH rules out primary hypothyroidism but not secondary

hypothyroidism.

- Normal value-0.4 to 4.0mu/l

Exclusion Criteria

- Patients taking drugs which alter thyroid profile like iodine containing drugs amiodarone, steroids, phenytoin, estrogen pills and beta-blockers.
- Patients with acute severe illness which can cause abnormalities of circulating TSH and thyroid hormones in the absence of underlying thyroid disease.
- Patients with renal failure/significant proteinuria.

RESULTS

Fifty metabolic syndrome patients attending Hypertension Clinic, Diabetology Outpatient and General Medicine Outpatient were randomly screened. The same population consist of 25 males and 25 females.

Table : 1 - FREQUENCIES OF METABOLIC SYNDROME PATIENTS AMONG THE TSH SUBGROUPS

TSH	Male		Female		Male + Female	
	No.of Patients	%	No.of Patients	%	No.of Patients	%
<4	18	72	15	60	33	66
4-20	6	24	8	32	14	28
>20	1	4	2	8	3	6

This shows 33 patients were euthyroid, 14 patients have subclinical hypothyroidism and 3 patients have clinical hypothyroidism which were 66%, 28% and 6% respectively. There is slightly higher incidence of female patients developing metabolic syndrome than males.

Table : 2 - COMPARING THE COMPONENTS OF MET.SYN AND FREE T4 AMONG THE TSH SUBGROUPS

FREE T4				
	No.of Patients	MEAN	SD	SE
below 4	33	1.39	0.48	0.08
4 to 20	14	1.02	0.33	0.09
above 20	3	0.3	0.04	0.02
WAIST CIRCUMFERENCE				
	No.of Patients	MEAN	SD	SE
below 4	33	92.30	6.79	1.18
4 to 20	14	92.71	8.52	2.28
above 20	3	96.67	2.08	1.20
TRIGLYCERIDES				
	No.of Patients	MEAN	SD	SE
below 4	33	179.03	65.86	11.46
4 to 20	14	172.79	67.15	17.95
above 20	3	195.33	101.26	58.46
HDL				
	No.of Patients	MEAN	SD	SE
below 4	33	39.42	4.94	0.86
4 to 20	14	38.93	7.07	1.89
above 20	3	33.33	5.13	2.96

These patients were divided into sub-groups based on the TSH values. TSH < 4 mU/l as euthyroid group, TSH 4- 20mU/l as subclinical hypothyroid and TSH >20 mU/l as clinical hypothyroidism. From these groups the following data were obtained.

DISCUSSION

Estimate of hypothyroidism prevalence in Leida, Spain shows The prevalence of hypothyroidism is 8.4 cases per 1000 Inhabitants; 2.4 cases per 1000 among males and cases 1000 among females. By age groups: Under age 15; 6 cases per 1000, 15-64 age groups 6.8 cases per 1000 and those over age 64, 12.5 cases 1000.

The highest figures were found in the rural areas 10.5 cases per 1000 and the lowest in urban areas 5.8 cases per 1000. This study concluded that Hypothyroidism under treatment figure is, as in other studies,

higher among females and predominant among those over 64 years of age⁹.

The Third National Health and Nutrition Examination Survey (NHANES III) of 17,353 individuals reflecting the US population reported hypothyroidism (defined as elevated TSH levels) in 4.6% of the population (0.3% overt and 4.3% subclinical)¹⁰

Sub-clinical hypothyroidism was found in 9.5% of self selected US population according to Colorado thyroid disease prevalence study¹¹.

Clinically apparent acquired impairment of thyroid function affects about 2% of adult women and about 0.1 to 2% of adult men according to Whickham survey¹².

The prevalence of sub clinical hypothyroidism as per Harrison's, Principles of Internal Medicine is 6 to 8% in women (10% over the age of 60) and 3% in men. The annual risk of developing clinical hypothyroidism is about 4% when sub clinical hypothyroidism is associated with positive TPO antibodies.

The prevalence of sub clinical hypothyroidism and clinical hypothyroidism in our study where 28% and 6% respectively in metabolic syndrome patients which is far higher than in general population. This may be due the following reasons;

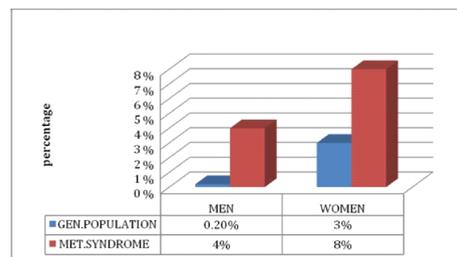
- Small size of study population.
- Previous study estimates the prevalence of hypothyroidism in general population but our study in those with metabolic syndrome
- Metabolic syndrome and hypothyroidism share some common pathway of pathogenesis of its clinical features like insulin resistance.
- A truly hypothyroid patient may be labeled as metabolic syndrome patients because of its common clinical features like hypertension, abnormal lipid profile, obesity etc.

The proportion of subclinical and clinical hypothyroidism in metabolic syndrome patients in our study is slightly more common in female study group than males.

Comparing the average HDL values between euthyroid, subclinical hypothyroidism and clinical hypothyroidism shows a slightly decreased value of HDL in subclinical hypothyroidism than and a moderately decreased HDL in clinical hypothyroidism.

Comparing the average triglyceride values shows a slightly lower value of triglyceride in subclinical hypothyroid than euthyroid patients and a higher value in clinical hypothyroidism Those patients with subclinical hypothyroidism had low normal values of free T4 than patients with normal thyroid function. This low free T4 level is associated with increased insulin resistance as already stated¹³.

PREVALENCE OF SUB-CLINICAL HYPOTHYROIDISM IN GENERAL POPULATION VS PATIENTS WITH METABOLIC SYNDROME.



Comparing the prevalence of Sub clinical hypothyroidism among metabolic syndrome by Goztepe training and research hospital with our study.

In Goztepe training and research hospital, the prevalence of SCH in met. Syndrome patients was higher than the control groups, but only female gender was associated with SCH. Our study shows much higher prevalence of SCH than previous study and both male and

female had SCH even though there is less incidence among males.

CONCLUSION

- 50 patients (25 males and 25 females) with metabolic syndrome attending medicine, diabetes and hypertension OPD in Stanley medical college where analysed for thyroid dysfunction.
- The prevalence of subclinical hypothyroidism and clinical hypothyroidism were 28% and 6% respectively which is far higher than in general population.
- There is slightly higher prevalence of female patient developing thyroid dysfunction than males.
- Those patients with subclinical hypothyroidism (raised TSH) had subnormal levels of freeT4.
- Thyroid dysfunction causes variations in the lipid profile.
- Since our study shows significant proportion of patient with metabolic syndrome had thyroid dysfunction and clinical manifestation like hypertension, abnormal lipid profile and obesity coexist in both ,it is mandatory to screen thyroid function for patients with metabolic syndrome.

REFERENCES

1. Expert panel on Detection, Evaluation and Treatment of High Blood Cholesterol in Adults. (2001). Executive summary of the Third Report of the National Cholesterol Education Programme (NCEP)- Adult Treatment Panel III (ATP III). *JAMA* 285, 2486-2497)
2. Gupta R, Deedwania P.C., Gupta A., Rastogi S., Panwar RB., Kothari K., Prevalence of the Metabolic Syndrome in an urban Indian population, *Int J Cardiol.* 2004 Nov; 97(2): 257-61.
3. Ford, E.S., Giles, W.H. et al, (2002). Prevalence of the Metabolic Syndrome among US adults: findings from the National Health and Nutrition Examination Survey. *JAMA* 287, 356-59
4. Harrison's Principles of Internal Medicine Ed: 16: 2104-2113.
5. Hypothyroidism and Diabetes Mellitus in an American Indian population *Journal of Family Practice*, July, 2000 by Arthur M. Michalek, Martin C. Mahoney, Donald Calebaugh.
6. Shobhanjan sarkar, Mithun Das, Barun Mukophadyay and others. High prevalence of the Metabolic Syndrome & its correlates in two tribal populations of India & the impact of urbanization. *Indian J Med Res* 123, May 2006, pp 679-686.
7. DeepaR, Shanthirani CS, Premalatha G, Sastry NG, Mohan V. Prevalence of insulin resistance syndrome in a selected South Indian population and the Chennai urban population study 7 (CUSP-7). *Indian J Med Res* 2002; 115: 118-27.
8. Borch-Johnsen K. Metabolic syndrome in a global perspective. *Ugeskr Laeger.* 2006 Sep 4; 168(36): 3032-34
9. M.Catalina Serina Armaiz, Leonardo Galvan Santiago, Eduardo Gasco Equiluz, Montserrat Manrique, M.Mar Foix Ona, Elisabet Martin Gracia. *Aten Primaria.* 2006 Nov 15; 38(8): 456-60.
10. Hollowell JG, Staehling NW, Flanders WD, Hannon WH, Gunter EW, et al. Hollowell JG, Staehling NW, Flanders WD, et al. Serum TSH, T(4), and thyroid antibodies in the United States population (1988 to 1994): National Health and Nutrition Examination Survey (NHANES III). *J Clin Endocrinol Metab.* Feb 2002;87(2):489-499.
11. Vanderpump MPJ, Tunbridge WMG, French JM, et al. The incidence of thyroid disorders in the community: a twenty-year follow-up of the Whickham survey. *Clin Endocrinol (Oxf)* 1995; 43:55-68.
12. Canaris GJ, Manovitz NR, Mayor G, et al. The Colorado thyroid disease prevalence study. *Arch Intern Med* 2000; 160:526-534.
13. AnemiekeRoos, Stephan J.L. Bakker, Thera P. Links, Rijk O.B. Gans, and Bruce H.R. Wolffenbuttel, Departments of Endocrinology and Internal Medicine, University Medical Center Groningen and University of Groningen, the Netherlands.