

STUDY OF THYROID TESTS IN PATIENTS WITH METABOLIC SYNDROME

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Abstract:

Background: The metabolic syndrome is a constellation of clinical and metabolic abnormalities including abdominal obesity, hypertension, dyslipidemia and impaired fasting glucose/or impaired glucose tolerance. Metabolic syndrome and thyroid dysfunction are independent risk factors for the cardiovascular disease.

Aims and Objectives: To study the prevalence, symptomatology of thyroid dysfunction and FNAC findings of thyroid in the patients having metabolic syndrome.

Material and Method: The study was carried out in 60 cases of metabolic syndrome (according to NCEP ATP III criteria) selected from the medicine outdoor clinic (including diabetic clinics, thyroid clinics) and medicine indoor wards. Diagnosis of thyroid dysfunction was made by history, examination and serum FT₄ and TSH.

Result and Observation: Out of 60 patients of metabolic syndrome 30 patients (50%) were euthyroid, 13 patients (21.66%) had subclinical hypothyroid and 12 patients (30%) had overt hypothyroid. 5 patients (8.33%) of metabolic syndrome had hyperthyroidism. Truncal obesity was most prevalent (80.0%) component of metabolic syndrome, next was hypertriglyceridemia (70%). Diabetes mellitus was equally prevalent in both males as well as females and was present in about 40.0% patients and 53% of patients with metabolic syndrome were hypertensive.

Conclusion: This study shows that 50% metabolic syndrome patients had thyroid dysfunction.in the form of 21.66% subclinical hypothyroidism, 20% overt hypothyroidism and 8.33% were having hyperthyroidism . The most common symptom in metabolic syndrome patients with hypothyroidism was lethargy / sleepiness followed by dry and coarse skin. The most common symptom in hyperthyroid patients was nervousness (100%) followed by sweating, heat intolerance and palpitation in 80% of the patients.

Keywords: Metabolic Syndrome, subclinical hypothyroid, hypothyroid

Introduction

The metabolic syndrome is a constellation of clinical and metabolic abnormalities including abdominal obesity, hypertension, dyslipidemia and impaired fasting glucose/or impaired glucose tolerance¹. All these manifestations are surrogate marker of insulin resistance which is the crux abnormality associated with metabolic syndrome. Thyroid hormones markedly stimulate the basic metabolic rate and the metabolism of carbohydrate, lipids and proteins. This hormone appears to serve as a general pacemaker accelerating metabolic process and may be associated with metabolic syndrome². It also plays an important role in the development of the reproductive system. As metabolic syndrome and thyroid dysfunction (subclinical or overt hypothyroidism and hyperthyroidism) are independent risk factors for cardiovascular disease, it is possible that patients suffering from both these disease entities may have a compounded risk³

The aim was to study the prevalence , symptomatology of thyroid dysfunction and FNAC findings of thyroid in the patients having metabolic syndrome.

Methods

In our study, 60 patients of metabolic syndrome without liver disease (viral, alcoholic, drug, autoimmune etc), chronic renal disease, pancreatitis and pregnancy were studied. Their clinical (age, sex, family history, Blood pressure), biochemical (TSH, FT₄, lipid profile, B. Sugar) and thyroid fine needle aspiration cytology (FNAC) profiles were studied. According to the National Cholesterol Education Program Adult Treatment Panel III (ATP III) at least three of the following criteria should be present to diagnose metabolic syndrome⁴.

1- Elevated waist circumference. Men - Equal to or greater than (90 cm for Indians). Women - Equal to or greater than (80 cm for Indians).

2-Elevated triglycerides :Equal to or greater than 150 mg/dL.

3-Reduced HDL ("good") cholesterol : Men - Less than 40 mg/dL, Women - Less than 50 mg/dL

4-Elevated blood pressure : Equal to or greater than 130/85 mmHg.

5-Elevated fasting glucose : Equal to or greater than 100 mg/dL.

The thyroid hormone assays (f T₄ and TSH) were done using ELISA; and fasting blood sugar, triglycerides and HDL-C were done enzymatically on Roche Automated clinical chemistry Analyzer.

Diagnosis of thyroid dysfunction was made by fT₄ and TSH. Euthyroid: normal TSH and normal fT₄, Subclinical hypothyroidism: high TSH and normal fT₄. Hypothyroidism: high TSH and low fT₄. Hyperthyroidism : low TSH and high fT₄.

Observations

Our study group consisted of 24 male (40%) and 36 (60%) female patients. Male to female ratio was 2:3. Majority of patients (40.0%) belong to age group 40-49 years. Mean age of all the patients was 47.6 ± 7.5 years. The mean age of males and females was 49.6 ± 8.0 and 46.2 ± 7.1 respectively.

The prevalence of component of metabolic syndrome (figure-1) in men and women were, central obesity in 18 (75%) and 30 (83.3%) patients respectively, low HDL cholesterol in 12 (50%) and 28(77.8%) patients respectively, high triglycerides in 18 (75%) and 24 (66.7%) respectively, impaired fasting glucose (>100 mg/dl) or diabetes in 12 (50.0%) and 12(33.3%) respectively and elevated blood pressure in 18 (75%) of men and 32(88.9%) of women.

Out of 60 patients of metabolic syndrome (figure-2), 30 patients (50%) were euthyroid, 13 patients (21.66%) had subclinical hypothyroid and 12 patients (20%) had overt hypothyroid while 5 patients (8.33%) had hyperthyroid respectively.

The most common symptom (table-1) in both subclinical and overt hypothyroid patients was (77.77%) lethargy (sleepiness) followed by dry and coarse skin (72.22%), Cold intolerance (66.66%), puffiness of face (66.66%), constipation (61.11%). Depression (55.55%) and body aches (55.55%). Weight gain in 50% and paresthesia in 44.44% hypothyroid patients. Thyroid gland size was enlarged in (33.33%) 6 patients. 5 hypothyroid females (33.33%) had menorrhagia. Hair loss was present in 5 patients (27.77%).

The total no. of hyperthyroid patients were 5 in the study. The commonest symptom (table-2) was nervousness (100%) in our patients. Other symptoms like sweating (80%), hypersensitivity to heat (80%) and palpitation (80%) were also common in these patients. Fatigue and weight loss and enlarged thyroid (goitre) were present in 3 patients (60%). One male and one female hyperthyroid patients had hyper defecation.

12 thyroid dysfunction patients with metabolic syndrome underwent FNAC of thyroid gland. Out of 12 patients, 8 patients (66.66%) had normal cytological findings. Two (one subclinical hypothyroid and one overt hypothyroid) patients had simple colloid goitre and one overt hypothyroid had nodular colloid goitre. One hyperthyroid patient with metabolic syndrome had nodular hyperplasia of thyroid gland.

Discussion

In our study out of 60 patients of metabolic syndrome, 30 patients (50%) were euthyroid, 13 patients (21.66%) had subclinical hypothyroid and 12 patients (30%) had overt hypothyroid. 5 patients (8.33%) of metabolic syndrome had hyperthyroidism. A cross sectional study from South India (G.P.S Shantha et al.) has shown prevalence of sub-clinical hypothyroidism (SCH) (21.9%) and overt hypothyroidism in 7.4% cases of metabolic syndrome².

The female to male ratio in our study was 2.25 : 1 in subclinical hypothyroidism and 2:1 in overt hypothyroidism patients. The female to male ratio in hypothyroidism ranges from 2:1 to 8:1 in

various epidemiological surveys (Helfand M et. al. study⁵ and Tunbridge WM et al study⁶). Recent surveys indicate hypothyroidism to be more prevalent in elderly population, reaching as high as 20%⁷. S. Shrestha et. al, observed association of metabolic syndrome in 21,7 and 6 cases in 48 euthyroid,24 hypothyroid and 28 hyperthyroid groups respectively⁸.

The commonest symptom in hypothyroid patients was lethargy (77.77%). This was consistent with case control study of Irfan M. Khurram et al⁹. in which 67.9% cases had lethargy. In our study too, dry and coarse skin was mentioned by 72.22% of patients like Murray's 70%-79% cases. Similarly, cold intolerance, that was found in 89% of the Lermann's series¹⁰ and 93% of the Murray's, was prevalent in 66.66% of our cases, which is quite comparable to the 58.25% in Watanakunakorn's¹¹. Five out of 14 (35.57%) females had menorrhagia as in study of Irfan M. Khurram et al. In cohort study of Scott JC, Mussey E. , 28 women (56%) complained of menstrual disturbance, with the most common complaint being menorrhagia (occurring in 18 (36%) of the women)¹². Other symptoms like body aches, weight gain, constipation, paresthesia, hair loss were similar to what has been described in various studies^{9,10,11}.

In our study 66.66% patients had puffiness of face as compared to 69.3% by Irfan M. Khurram et al⁹, 79% in Lermann's series¹⁰ and 67% in Watanakunakorn's series¹¹.

Thyroid was enlarged in 6 hypothyroid patients (33.33%) as compared to 6.6% in B.B.Samanta study¹³.

The most common symptom in hyperthyroid patients was nervousness (100%) followed by sweating(80%), hypersensitivity to heat (80%), palpitation (80%), weight loss (60%), fatigue (60%), hyper defecation (40%) and Goitre (60%) which was statistically comparable with the study of Christophe Trivalle et al¹⁴.

Out of 12 patients underwent FNAC of thyroid, 8 patients (66.66%) had normal cytological findings. 2 (one subclinical and one overt) hypothyroid patients had simple colloid goitre. and one overt hypothyroid patients had nodular colloid goitre. One hyperthyroid patient with metabolic syndrome had nodular hyperplasia of thyroid gland.

In this study we found that out of 60 patients of metabolic syndrome, 24 (40%) were male and 36 (60%) female. Male to female ratio was 2 : 3 proving that disease was more dominant in females. Most of the patients of metabolic syndrome were belonging to age group 40 – 60 years. Mean age of male was 49.6 ± 8.0 years and mean age of female patients was 46.2 ± 7.1 years. Mean age of patients with metabolic syndrome in a study by Bacon and colleagues¹⁵ was 47 years and similarly Ludwig J. et al also noted mean age of 54 years. 23.3% of the patients met all the five diagnostic components of metabolic syndrome. Waist circumference was elevated in almost all (80%) the cases. Other components of metabolic syndrome were distributed in 50 to 70% of the patients.

Majority of male patients (45%) had waist circumference in range of 90 – 100 cm. Mean waist circumference of male was 97.9 ± 7.2 cm. Most of the female patients (40%) had also waist circumference in 90 – 100 cm range. Mean waist circumference of female patients was 97.8 ± 2.1 cm. In previous studies mean waist circumference of males and females was 102 cm and 92

cm respectively (Deferoza RA. et al)¹⁶. About 62% of the patients had triglyceride level between 150 – 174 mg%. Only 14.3% had elevated triglyceride level more than 200 mg%. Mean triglyceride level of males was 160.1 ± 22.6 mg%. Mean level of triglyceride in females was 162.7 ± 27.2 mg%. Liese AD, Ayer M. et al¹⁷ noted hypertriglyceridemia in 50% of the cases. In previous studies it was observed that mean triglyceride level in the patients of metabolic syndrome was 191.8 mg% (Alshkri MM. et al)¹⁸.

About half of the patients (50.0%) has HDL level between 30 – 39 mg/dl, mean HDL level of males was 40.8 ± 6.4 mg/dl. Female patients had mean HDL level 43.4 ± 7.5 mg/dl. There was significant variation in mean HDL level between male and female patients. Similar studies in the past observed HDL abnormalities in 63.5% of the patients) (Saely CH, Koch L. et al)¹⁹.

In our study 40% patients of metabolic syndrome were diabetic. Only 8.3% patients had Blood Sugar in IGT range, 16.6% patients were newly diagnosed diabetic. Maximum no of patients (41.7%) were diabetic for duration more than 10 years. Matteoni et al (1999)²⁰ also performed similar study and found diabetes mellitus in 23% of cases.

In our study 53% of patients with metabolic syndrome were hypertensive. 25% were newly diagnosed hypertensive. 37.5% had hypertension for duration more the 10 years. Kaplan NM and colleagues²¹ noted prevalence of hypertension in 58% patients of metabolic syndrome.

Conclusion:

The present study concludes that 50% metabolic syndrome patients had thyroid dysfunction. Subclinical hypothyroidism was present in 21.66% and overt hypothyroidism 20% patients. Hyperthyroidism was observed in 8.33% of metabolic syndrome patients.

The most common symptom in metabolic syndrome patients with hypothyroidism was lethargy/ sleepiness followed by dry and coarse skin.

The most common symptom in hyperthyroid metabolic syndrome patients was nervousness (100%) followed by sweating, heat intolerance and palpitation (80%) in each respectively. Thyroid dysfunction patients with metabolic syndrome presented with goiter underwent FNAC of thyroid, 8 patients (66.66%) had normal cytological findings. 2 (one subclinical and one overt) hypothyroid patients had simple colloid goitre. and one overt hypothyroid patients had nodular colloid goitre. One hyperthyroid patient with metabolic syndrome had nodular hyperplasia of thyroid gland.

Metabolic syndrome and thyroid dysfunction are independent risk factors for the cardiovascular disease. There co-existence may even compound the risk of cardiovascular events. Hence it is worthwhile to screen metabolic syndrome patients for thyroid dysfunction earliest possible for further decrease in cardiovascular events.

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Figure-1

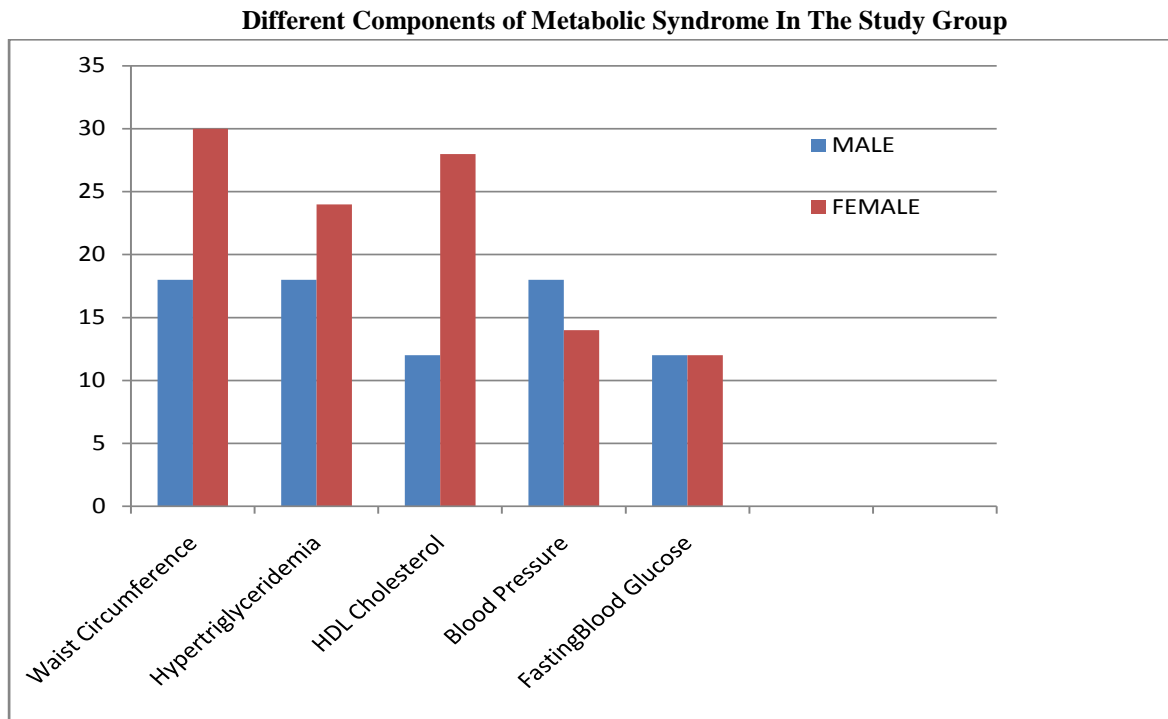


Figure-2

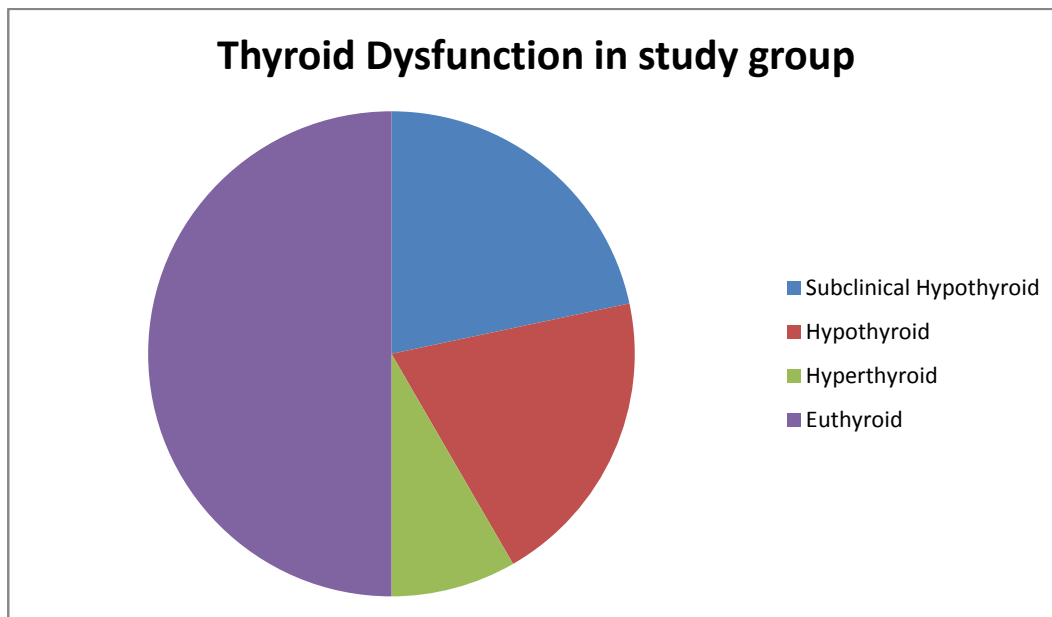


TABLE-1

PREVALENCE OF SYMPTOMATOLOGY OF HYPOTHYROIDISM IN THE STUDY GROUP

Symptoms	MALE (N=4)		FEMALE (N=14)		TOTAL (N=18)	
	No.	%	No.	%	No.	%
Lethargy /Sleepiness	3	75	11	78.57	14	77.77
Dry and coarse skin	3	75	10	71.42	13	72.22
Cold intolerance	2	50	10	71.42	12	66.66
Puffiness of face	2	50	10	71.42	12	66.66
Body aches	2	50	8	57.14	10	55.55
Weight Gain	2	50	7	50	9	50
Constipation	2	50	9	57.14	11	61.11
Depression	2	50	8	57.14	10	55.55
Paresthesia	2	50	6	42.85	8	44.44
Menorrhagia	-	-	5	35.57	5	35.57
Thyroid gland size enlarged	1	25	5	35.71	6	33.33
Hair loss	1	25	4	28.57	5	27.77

TABLE-2
PREVALENCE OF SYMPTOMATOLOGY OF HYPERTHYROIDISM IN THE STUDY GROUP

Symptoms and signs	MALE (N=2)		FEMALE (N=3)		TOTAL (N=5)	
	No.	%	No.	%	No.	%
Nervousness	2	100	3	100	5	100
Sweating	2	100	2	66.66	4	80
Hypersensitivity to heat	1	50	3	100	4	80
Palpitation / Increased Heart Rate	2	100	2	66.66	4	80
Fatigue	1	50	2	100	3	60
Goitre	1	50	2	77.77	3	60
Hyper defecation	1	50	1	33.33	2	40
Weight loss	1	50	2	66.66	3	60