

Prevalence of Metabolic Syndrome in Thyroid Disorders

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Abstract

Background:

Metabolic syndrome constitutes a cluster of risk factors characterized by hypertension, atherogenic dyslipidemia, hyperglycemia, prothrombotic and pro-inflammatory conditions. Thyroid disorder is a medical condition that affects the function of the thyroid gland. Aim of the study was to find which parameters of metabolic syndrome are associated with Thyroid disorders and to find prevalence of metabolic syndrome in thyroid disorders.

Methods:

60 patients who are having Hypothyroidism and Subclinical Hypothyroidism and hyperthyroidism and fulfil inclusion and exclusion criteria, attending MGM hospital, Kamothe, Navi Mumbai during the period of January 2016 to July 2017 were enrolled for the study.

Results:

The overall prevalence rate of metabolic syndrome in the study was 80 percent. The prevalence of metabolic syndrome in subclinical hypothyroidism was 83.33 % while in overt hypothyroidism its 86.66% while in hyperthyroidism its 33.33 %.

Conclusion:

There is a positive association of metabolic syndrome in patients with Thyroid disorder more with hypothyroidism as compared to hyperthyroidism. Early screening, detection and intervention can reduce the cardiovascular events in thyroid disorders.

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I. Introduction

Metabolic Syndrome affects approximately one quarter of the population in developed countries. Metabolic syndrome constitutes a cluster of risk factors characterized by hypertension, atherogenic dyslipidemia, hyperglycemia, prothrombotic and pro-inflammatory conditions. Obesity, insulin resistance, physical inactivity, advanced age and hormonal imbalance are underlying risk factors for the development of the syndrome. According to the new criteria of IDF, Metabolic syndrome can also be called as -central obesity syndrome (Gary 2006)

Thyroid disorders

It is a medical condition that affects the function of the thyroid gland (the endocrine organ found at the front of the neck that produces thyroid hormones).The symptoms of thyroid disease depends on four general types: 1) hypothyroidism (low function) caused by insufficient thyroid hormone levels; 2) hyperthyroidism(high function) caused by excessive thyroid hormone levels; 3) structural abnormalities, most commonly an enlargement of the thyroid gland; and 4) tumors which can be cancerous or benign. Without any clinical symptoms it is possible to have abnormal thyroid function test. Common hypothyroid symptoms include weight gain, fatigue, low energy, inability to tolerate the cold, slow heart rate, dry skin and constipation. Common hyperthyroid symptoms include weight loss, irritability, fast heartbeat, heat intolerance, diarrhea, and enlargement of the thyroid.

Treatment varies based on type of thyroid disorder. For people with hypothyroidism; Levothyroxine is the mainstay of treatment while people with hyperthyroidism caused by Graves' disease can be managed with iodine therapy, antithyroid medication, or surgical removal of the thyroid gland. Thyroid surgery may also be performed to remove a thyroid nodule or lobe for biopsy, or if there is a goiter that is unsightly or obstructs nearby structures.

Diagnosis of thyroid disease depends on symptoms and whether or not a thyroid nodule is present. Most patients received a blood test. Others might need an ultrasound, biopsy or a radioiodine scanning and uptake study.

Objectives

The study aimed to find out the following:

- 1.) To find which parameters of metabolic syndrome are associated with Thyroid disorders.
- 2.) To find prevalence of metabolic syndrome in thyroid disorders.

II. Methods

Patients who are having Hypothyroidism and Subclinical Hypothyroidism and hyperthyroidism and fulfil inclusion and exclusion criteria, attending Inpatient and/or Outpatient department MGM hospital, Kamothe, Navi Mumbai during the period of January 2016 to July 2017 were selected for the study.

Inclusion Criteria:

1. Age between 18 years to 60 years
2. Both Male and Female
3. Known Thyroid disorder patients.

Exclusion Criteria:

Patients with metabolic syndrome on/not-on any medications – newly detected metabolic syndrome patients.
 Patients taking steroids, medications for diabetes mellitus, hypertension, dyslipidemia.
 Individual less than 18 years age and above 60 years.
 Critically ill patients
 Pregnant women

Data was collected using a pretested proforma meeting the objectives of the study. Detailed history and necessary investigations was done.

Prevalence of metabolic syndrome in these patients was studied by IDF criteria:

Central obesity -defined as waist circumference with ethnicity specific values (for south Asians: ≥ 90 cm for Men and ≥ 80 cm for women were used)

AND any two of the following:

- Raised triglycerides: > 150 mg/dL
- Reduced HDL cholesterol: < 40 mg/dL in males, < 50 mg/dL in females
- Raised blood pressure: systolic BP > 130 mm of Hg or diastolic BP > 85 mm of Hg
- Raised fasting plasma glucose :(FPG) > 100 mg/dL

INVESTIGATIONS

1. Fasting plasma glucose
2. Thyroid assay includes TSH, FT3, FT4 (when TSH is abnormal)
3. Lipid profile includes Triglycerides , HDL ,LDL, Total cholesterol
4. Blood pressure recording
5. Waist circumference

III. Results

The analysis showed that the number of cases in subclinical hypothyroidism was 24, in overt hypothyroidism was 30 and in hyperthyroidism it was 6. More number of cases was in the age group of 41 – 50 years. Analysis showed that the maximum cases were in subclinical group and overt hypothyroidism together in age group of 41 – 50 with p-value < 0.05 . Analysis also showed that more female cases occurrence is there in the overt hypothyroidism group. From the analysis it was found that the proportion of females (44 cases) that is 73.33% in the study cases was more as compared to males (16 cases) that is 26.67%. Analysis showed that females cases were significantly more as compared to males with p value < 0.05 .

Parameter	Normal Value	Subclinical Hypothyroidism (Mean with SD)	Overt Hypothyroidism (Mean with SD)	Hyperthyroidism (Mean with SD)
Waist circumference	High Risk Men: > 102 cm (> 40 in.) Women: > 88 cm (> 35 in.)	Male 94.3 ± 7.8 Female 83.2 ± 5.4	Male 95.2 ± 8.2 Female 84.6 ± 4.8	Male 93.8 ± 5.2 Female 82.5 ± 4.2
BMI	18.5 to 24.9	26.6 ± 2.1	28.3 ± 2.4	25.1 ± 2.2
FPG	ADA: 80 to 130 mg/dl AACE: < 110 mg/dl	134 ± 6.8	132.2 ± 6.4	130.8 ± 4.2
HDL	40-50 mg/dl	Male 39 ± 6.1	Male 38.4 ± 4.4	Male 41.3 ± 2.2

		Female 34.2± 2.2	Female 36.1 ± 4.1	Female ± 1.8
TG	>150 mg/dl	168 ± 54	188 ± 62	158 ± 40
SBP	>120 mm Hg	128 ± 12	132 ± 14	124 ± 10
DBP	>80 mmHg	84 ± 6	86 ± 8	82 ± 6

IV. Discussion

Metabolic syndrome is very common in thyroid disorders. The mean age of the cases was 46.2 yrs. It is consistent with the mean age of studies done before. Anthonia et al in 2012 says that his study subjects were aged between 14 and 76 years, with a mean age of 44.5 years. More cases were in the age group of 40-50 years.

The mean BMI in subclinical cases was 26.6 cm, in overt hypothyroidism its 28.3 and in hyperthyroidism its 25.1 cm. Study conducted by Haqueet al revealed that both BMI and waist circumference were greater in SCH group compared to that of euthyroid controls.

The mean TSH level was 7.5 in Subclinical group, 9.5 in overt hypothyroidism and 0.2 in hyperthyroidism. Tiredness, Unexplained weight gain, Slow movement, Muscle cramps, Sensitivity to cold temperatures, Constipation, Depressed mood, Memory difficulty, anxiety and irritability were the commonest symptoms.

The mean SBP in subclinical cases was 128, in overt hypothyroidism its 132 and in hyperthyroidism its 124. In the study, subjects with hypothyroidism had the greatest frequency of occurrence of hypertension. Hypothyroidism is a potentially important but overlooked cause of hypertension, and possible pathophysiological mechanisms responsible for the occurrence of hypertension in hypothyroidism include changes in circulating catecholamines, their receptors and renin-angiotensin-aldosterone.

The mean DBP in subclinical cases was 84, in overt hypothyroidism its 86 and in hyperthyroidism its 82 cm.

The overall prevalence rate of metabolic syndrome in this study was 80 percent. The overall prevalence rate of the metabolic syndrome in this study was much lower than the 86% rate reported in the diabetes population and the 59% rate reported in the general population among Nigerians.

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Table 1 Distribution of cases as per age

Age group (in years)	Total number of cases
18-30	7
31-40	20
41-50	30
51-60	3

Graph 1: Distribution of cases as per age

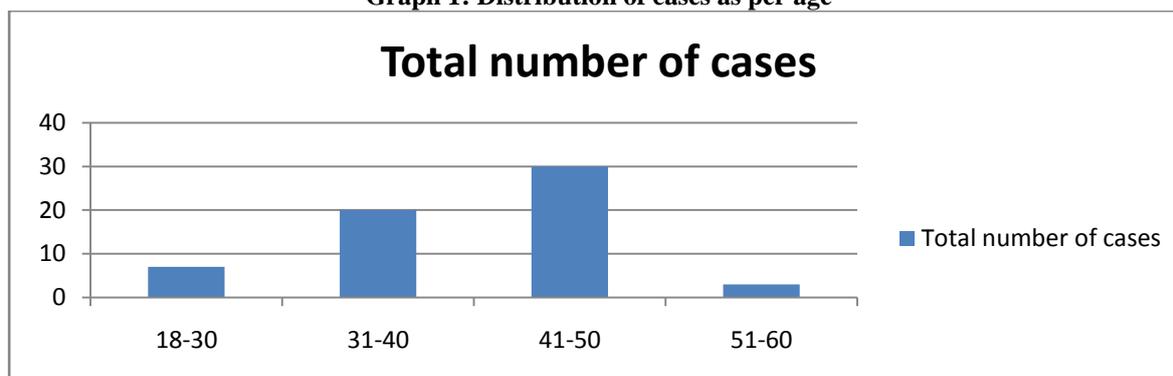


Table 2: Distribution of cases as per age and type of Thyroid disorder

Age group	subclinical	Overt	Hyperthyroidism
18-30	3	3	1
31-40	6	12	2
41-50	14	14	2
51-60	1	1	1
Total	24	30	6

Graph 2: sex wise distribution of cases.

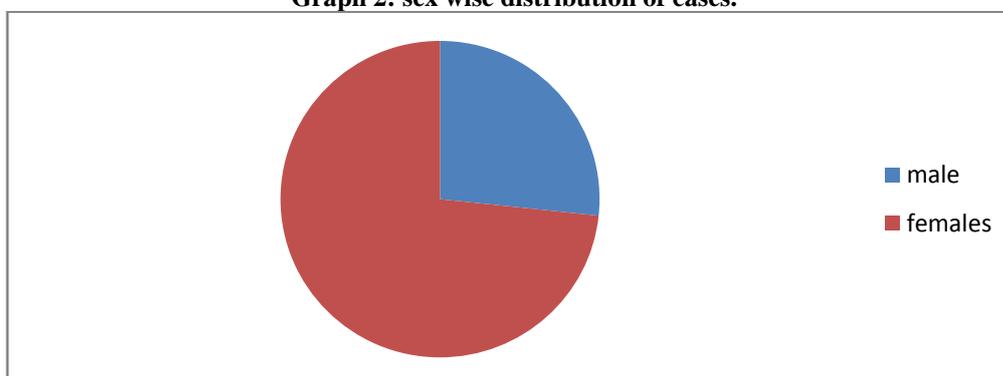


Table 3 Sex wise distribution of cases in different type of thyroid disorders

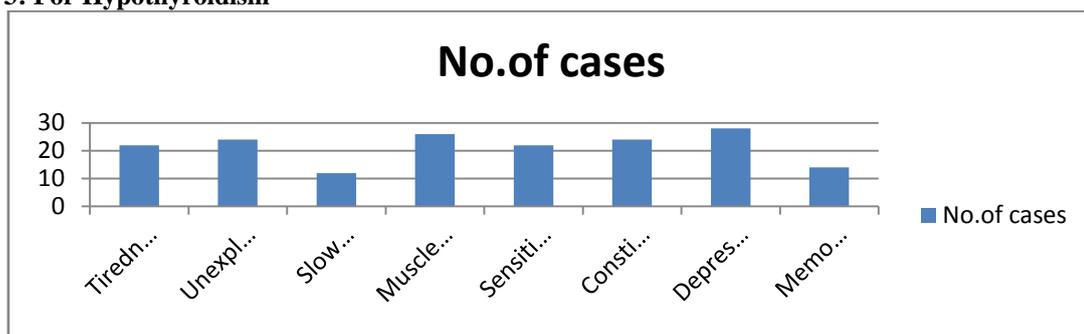
Sex	subclinical	overt	Hyperthyroidism
Male	6	8	2
Female	18	22	4

Table 4 Mean free T3, free T4, TSH levels in different types of thyroid diseases

Type of thyroid hormone	Subclinical Hypothyroidism	Overt Hypothyroidism	Hyperthyroidism
Mean free T3	2.8 ng/dL	2.4 ng/dL	5.5 ng/dL
Mean free T4	0.9 ng/dL	0.76 ng/dL	2.0 ng/dL
Mean TSH	7.5 micro IU/ml	9.5 micro IU/ml	0.2 micro IU/ml

Distribution of cases as per symptoms

Graph 3: For Hypothyroidism



Graph 4: For Hyperthyroidism

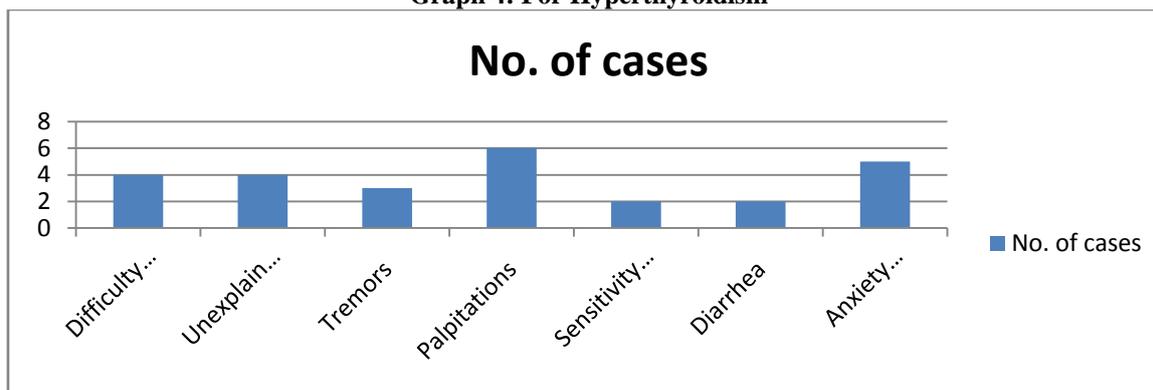


Table 5 Shows Mean waist circumference of patients in different type of Thyroid disorders

Waist circumference	Subclinical Hypothyroidism	Overt Hypothyroidism	Hyperthyroidism
Mean with SD	Male 94.3 ± 7.8 Female 83.2 ± 5.4	Male 95.2 ± 8.2 Female 84.6 ± 4.8	Male 93.8 ± 5.2 Female 82.5 ± 4.2

Graph 5:

The mean waist circumference in subclinical cases was Male 94.3 ± 7.8 Female 83.2 ± 5.4, in overt hypothyroidism its Male 95.2 ± 8.2 Female 84.6 ± 4.8 and in hyperthyroidism its Male 93.8 ± 5.2 Female 82.5 ± 4.2

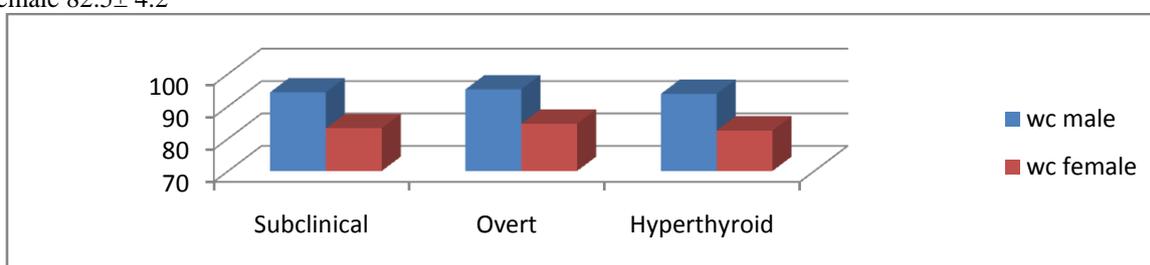


Table .6 Mean BMI in different type of thyroid disorder

BMI	Subclinical Hypothyroidism	Overt Hypothyroidism	Hyperthyroidism
Mean with SD	26.6 ± 2.1	28.3 ± 2.4	25.1 ± 2.2

Table no. 7 Mean FPG value and in different type of thyroid disorder

FPG	Subclinical Hypothyroidism	Overt Hypothyroidism	Hyperthyroidism
Mean with SD	134 ± 6.8	132.2 ± 6.4	130.8 ± 4.2

Table 8 Mean HDL in different type of thyroid disorder

HDL	Subclinical Hypothyroidism	Overt Hypothyroidism	Hyperthyroidism
Mean with SD	Male 39 ± 6.1 Female 34.2 ± 2.2	Male 38.4 ± 4.4 Female 36.1 ± 4.1	Male 41.3 ± 2.2 Female ± 1.8

Table 9 Mean TG in different type of Thyroid disorder

TG	Subclinical Hypothyroidism	Overt Hypothyroidism	Hyperthyroidism
Mean with SD	168 ± 54	188 ± 62	158 ± 40

Table 10 Mean SBP in different type of thyroid disorder

SBP	Subclinical Hypothyroidism	Overt Hypothyroidism	Hyperthyroidism
Mean with SD	128 ± 12	132 ± 14	124 ± 10

Table 11 Mean DBP in different type of thyroid disorder

DBP	Subclinical Hypothyroidism	Overt Hypothyroidism	Hyperthyroidism
Mean with SD	84 ± 6	86 ± 8	82 ± 6

Graph 6: Distribution of cases as per prevalence of metabolic syndrome

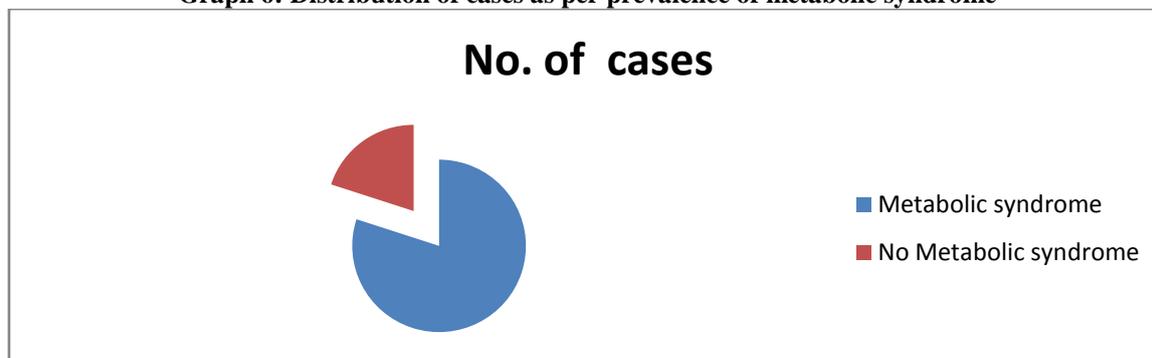


Table 12. Distribution of cases as per prevalence of metabolic syndrome in each type of thyroid disorder

Metabolic syndrome	Subclinical Hypothyroidism	Overt Hypothyroidism	Hyperthyroidism
Frequency	20 (83.33%)	26(86.66%)	2(33.33)

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