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Original Research Article

Glycaemic regulation and metabolic syndrome: A reference to thyroid function state

Abha Pandit[1], Abhay Kumar Pandey[2]*
[1]Department of Medicine, Index Medical College, Hospital and Research Centre, Indore (MP), India
[2]Assistant professor, Department of Physiology, Government Medical College, Banda (UP), India

***Corresponding author**
Abhay Kumar Pandey
Email: abhay.physiology@gmail.com

Abstract: Study on 63 apparently overweight patients reporting medical outdoors for minor complaints were examined for presence of metabolic syndrome. Patients' euthyroid as per hormone tests were grouped as having relatively higher and lower TSH profiles and compared for preponderance of clinical and biochemical evidences of metabolic syndrome. Further normal individuals and those diagnosed as metabolic syndrome in the study sample were compared for differences in thyroid function tests. There is no evidence whatsoever to suggest thyroid function link to metabolic syndrome, in presented limited patient sample from central India.
Keywords: Metabolic syndrome; Thyroid dysfunction; Type 2 diabetes

INTRODUCTION

Thyroid hormones are major regulators of energy homeostasis, lipid and glucose metabolism and blood pressure. Metabolic syndrome (MS) starts with insulin resistance (IR), in which get added truncal obesity, hyperglycaemia and diabetes mellitus, dyslipidaemia and hypertension. Studies have shown significant relation of within euthyroid range low or high TSH levels to IR and components of MS. Potential link between leptin and thyroid hormone function is suggested supporting the case [1, 2]. Investigation of thyroid hormones and TSH levels in euthyroid subjects exhibiting MS, vis-à-vis IR, serum lipid profiles and components of MS was carried out in medical outpatients at Ashadeep Hospital, a private multispecialty hospital at Indore (MP), central India. A humble local evidence base is thus provided to support clinical practice.

SUBJECTS AND METHODS:

63 euthyroid adults in 18 to 60 year age range and apparently overweight attending medical outdoor for various minor ailments, during the year 2011-2012 were studied following obtaining informed written consent for the same. Patients giving history of thyroid disease or medication were strictly excluded. Determination of presence of MS in study subjects included presence of at least 3 of following diagnostic features, viz. fasting blood glucose above 110mg/dl; truncal obesity by waist circumference above 88cm in women and above 102 cm in men; hypertension above 135 mmHg systolic and 85 mmHg diastolic; Hypertriglyceridaemia of above 150 mg/dl [3]. Cut off hormone concentration levels for euthyroid state adopted were, TSH 0.35-4 mmol/l; T3 1.71 to 4.71 pg/ml; and T4 0.8 to 1.9 ng/ml.

Medical history was taken and physical examination performed in all subjects at induction in study. Blood pressure was measured with same sphygmomanometer twice at interval of 5 minutes after 10 minutes bed rest. Average values were noted. Anthropometric measurements included height and weight recording. The waist circumference was measured at narrowest trunk between lower margin of thoracic cage and the iliac crest, in middle of respiration. Bodymass index (BMI) for each individual was calculated as weight in Kg/ (height in meter)^2.

LABORATORY INVESTIGATIONS

After overnight fasting, morning venous blood samples were obtained for determination of fasting blood sugar (FBG), insulin, LDL cholesterol, triglycerides, T3, T4 and TSH levels. Insulin resistance was calculated as (insulin IU/ml X FBG mmol/l)/22.5 [4]. All estimations were as per standard laboratory practices in vogue, viz. blood glucose by glucose oxidase method; lipid profile via enzymatic quantitative

analyses, serum. Serum insulin, T3, T4, TSH levels by specific enzymatic immunoassays.

RESULTS

The indicator profile of study subjects as a whole is presented in table 1.Based on the profile of TSH, subjects were divided in to two groups lower TSH ((under 2.5 mmol/l) 42 cases) and high TSH ((above 2.5 mmol/l) 21 cases). Group 1 thus included 7 males and 35 female patients. Group 2 had 2 males and 19 females. The comparative profiles of markers in the two groups are presented in table 2.

Table 1: Parametric profile of 63 subjects included in the study

Parameters	Value (Mean ±SD)
Number	63
Age	39.62 ± 13.4
BMI Kg/m^2	30.72 ± 7.1
Waist circumference (cm)	91.3 ± 15.2
FBG mg/dl	96.2 ± 12.1
Insulin IU/ml	11.5 ± 5.76
IR value	2.7 ± 1.48
Systolic BP (mmHg)	116 ± 18.7
Diastolic BP (mmHg)	71 ± 12.1
Total Cholesterol mg/dl	198 ± 40.6
Triglyceride mg/dl	148.8 ± 90.2
HDL Cholesterol mg/dl	45.5 ± 11.6
TSH mmol/l	2.2 ± 1.3
T3 mmol/l	2.8 ± 0.5
T4 mmol/l	1.16 ± 0.2

Table 2: Comparative profile of various parameters in high and low TSH groups within euthyroid range

Parameters	Gr 1 (low TSH) Mean ±SD	Gr 2 (high TSH) Mean ±SD
Number	42	21
Age	40.1 ±14.2	36.5 ± 16.2
BMI Kg/m^2	31.6 ± 6.1	32 ± 13.2
Waist circumference (cm)	93.4 ± 15.1	94.2 ± 16.8
FBG mg/dl	95.2 ± 10.2	94 ± 13.6
Insulin IU/ml	2.7 ± 1.4	2.6 ± 1.3
IR value	2.8 ± 2	2.63 ± 1.3
Systolic BP (mmHg)	117 ± 18	116.9 ± 18.3
Diastolic BP (mmHg)	71 ± 11.3	70.6 ± 10.8

These and other parameters did not significantly differ between the two groups. Only the deliberate segregation based on low and high TSH levels obviously led to very significant difference of TSH profile in the two groups. Thus THS mmol/l in Gr.1 was 1.17 ± 0.22 and in Gr. 2 was 1.18 ± 0.17 (p less than 0.01).21 (50%) of Gr.1 and 10 (47%) of Gr.2 fulfilled the criteria to be labeled MS. The profile of various thyroid hormones and TSH in the MS and Normal (non-MS) cases is presented in Table 3.

Table 3: Thyroid profile parameters in euthyroid Normal and in cases with MS

Parameters	Normal (non-MS) Mean ±SD	MS (Mean ±SD)
Number	35	25
T3 mmol/l	2.9 ± 0.5	2.86 ± 0.46
T4 mmol/l	1.16 ± 0.28	1.16 ± 0.24
TSH mmol/l	2.25 ± 1.44	2.27 ± 1.4

Thus thyroid function indicators did not significantly differ between normal and MS bearing individuals.

DISCUSSION

The results are discordant with large reported studies. Thus increased prevalence of MS with higher TSH in euthyroid range was reported by Lee, *et al.;* [5] and by Ruhla, *et al.;* [6]. These studies however relate to different regions of the globe with thousands of patient samples. Further their patients mostly comprised of sufferers with chronic disease. Although small in size the study findings may suggest to not going for unnecessary thyroid status investigation unless

clinically warranted while managing patients with type 2 Diabetes mellitus.

CONFLICT OF INTEREST STATEMENT

There are no conflicts among the authors.

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