



TO STUDY THE ASSOCIATION BETWEEN HYPOTHYROIDISM AND METABOLIC SYNDROME AT JHALAWAR MEDICAL COLLEGE AND SRG HOSPITAL JHALAWAR

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ABSTRACT **BACKGROUND:** The aim of this study was to explore the study of thyroid function in patients with metabolic syndrome. **METHODS:** This cross-sectional study was conducted on 200 patients with metabolic syndrome (MetS) (National Cholesterol Education Program's-Adult Treatment Panel III Criteria) in the study group and 100 subjects without metabolic syndrome in the control group. Anthropometric variables and blood pressure were taken using standardized technique and body mass index was calculated. TSH, T4 and T3 were measured using electrochemiluminescence immuno assay. **RESULTS:** The overall prevalence of thyroid dysfunction in patients with MetS was 44.00% with high prevalence of sub clinical hypothyroidism (28%). **CONCLUSION:** Hypothyroidism is associated with components of metabolic syndrome.

KEYWORDS : Metabolic Syndrome, Thyroid Stimulating Hormone, Hypothyroidism.

INTRODUCTION

The prevalence of overweight and obesity has been increasing significantly in recent decades. According to the World Health Organization, 21.5% and 4.6% are the crude estimates for the prevalence of overweight and obesity in the Southeast Asian regions. According to the National Family Health Survey-4, the prevalence of overweight and obesity (body mass index ≥ 25) is 18.9 and 20.6 among Indian men and women, respectively¹

Thyroid hormones play an important role in regulating thermogenesis, and glucose and lipid metabolism, which make them a key factor regulating mammalian dynamic energy balance.² The low thyroid hormone concentration is associated with low-energy expenditure and fluid retention which may manifest as obesity. In India, hypothyroidism is considered to be the most common thyroid disorders affecting one in ten adults.³

Some studies have tried to attribute obesity to subclinical hypothyroidism. In obese patients, other than increased levels of thyroid-stimulating hormone (TSH), there should also be an increase in free T3 and T4 concentrations.^{4,5} This fact is inconsistent with the thought that subclinical hypothyroidism causes obesity. Thus, the relationship between thyroid function and body weight needs to be studied more.⁶

Metabolic syndrome constitutes a cluster of risk factors characterized by hypertension, atherogenic dyslipidemia, hyperglycemia, prothrombotic, and pro-inflammatory conditions. Serum TSH has been thought to have an association with metabolic risk factors. However, some studies^[11] found no significant differences in certain components of lipid profile among people with high and low TSH. This disparity implies that there is a clear lack of clarity with regard to whether TSH really regulates metabolism in people.

MATERIAL AND METHOD

This cross sectional study was conducted at the Department of general medicine, Jhalawar Medical College, Jhalawar, Rajasthan, India. The patients were randomly selected from the outpatient department of Department general Medicine. 100 patients with metabolic syndrome (MetS) who fulfilled the National Cholesterol, Education Program, Adult Treatment Panel III (NCEP-ATP III 2001) criteria were included in the study group (MetS group).⁶

The metabolic syndrome was diagnosed in the presence of any three or more out of five components, waist circumference (WC) > 102 cms in

men and 88 cms in women, blood pressure (BP) $> 130/85$ mmHg or on antihypertensive medications, fasting plasma glucose (FBG) > 110 mg/dL or on anti-diabetic medications, fasting triglycerides (TG) > 150 mg/dl, HDL-C < 40 mg/dl in males and < 50 mg/dl in females. Age and sex matched 100 healthy volunteers who had no features of metabolic syndrome were included in the control group.

Statistical analysis

Baseline characteristics of the study participants were expressed in mean \pm SD. Independent Student's 't' test was used to compare differences in baseline characteristics between the study group and the control group. Chi-square test and Fischer's exact chi square test were used for the comparison of qualitative data. $P < 0.05$ was considered statistically significant. Statistical analysis was performed using Epi-info software.

RESULTS

Table 1. Socio-demographic profile

Variable	Cases (n=100)	Control (n=100)	p-value
Age in yrs	50.02 \pm 8.14	51.14 \pm 8.02	> 0.05
Male : Female	63:37	65:35	> 0.05

Table 2. Thyroid dysfunctions

Variable	Cases (n=100)	Control (n=100)	p-value
Euthyroidism	56	90	0.001
Clinical hypothyroidism	14	3	
Sub clinical Hypothyroidism	28	7	
Sub clinical hyperthyroidism	2	0	

Table 3. Thyroid function test

Variable	Cases (n=100)	Control (n=100)	p-value
T3	1.12 \pm 0.62	1.41 \pm 0.48	0.001
T4	6.11 \pm 2.68	7.38 \pm 1.98	0.001
TSH	18.15 \pm 28.12	6.21 \pm 15.12	0.001

DISCUSSION

In this cross-sectional study, we observed that the prevalence of thyroid dysfunctions in MetS subjects was 44.00% and its pattern showed high prevalence of SCH (28.00%) followed by hypothyroidism (14.00%) and subclinical hyperthyroidism (2.00%). The above results are in agreement with previous studies showing an association between metabolic syndrome and thyroid dysfunctions.⁷⁻¹⁰

A study done by Meher LK et al showed a high prevalence of SCH (22%) and overt hypothyroidism (4%) in the MetS subjects.⁸ In addition, similar study from India has shown a high prevalence of SCH (21.90%) and overt hypothyroidism (7.40%) in patients with MetS.⁹ A recent study in Taiwan by Wang JY et al reported that thyroid dysfunctions were present in 7.21% of Taiwan MetS patients.¹⁰ This study had shown 4.55% had SCH and 2.64% had subclinical hyperthyroidism. Another study from Nepal showed that the prevalence of TD in patients with MetS was 31.84% and its pattern showed high prevalence of SCH (29.32%) followed by hypothyroidism (1.67%) and subclinical hyperthyroidism (0.83%).¹¹

Our study also suggested that T3 ($P < 0.001$) levels were significantly lower in the study group than in the control group, while TSH was significantly higher in the study group ($P < 0.001$). These findings were similar to those obtained in the studies on Hispanic population by Garcia GJ et al, Nepal population Gyawali P et al, and Chennai population by Shantha GP et al.^{9,11,12}

CONCLUSION

In conclusion, the prevalence of thyroid dysfunction was high in the patients with MetS. Thyroid hormone significantly affects and is associated with components of metabolic syndrome. Present study suggests that hypothyroidism is known to be associated with metabolic syndrome.

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