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ORIGINAL ARTICLE

Metabolic Syndrome in Patienet with Hypothyroidism Presenting in a Tertiaty Care Hospital

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ABSTRACT

This trial aimed to record the frequency of metabolic syndrome (MetS) in patients presenting with hypothyroidism.

Methods: This cross-sectional study was conducted at Niazi Medical and Dental College, Sargodha during Nov 21 to April, 22. We included a total of 130 diagnosed cases of hypothyroidism, a pre-designed questionnaire was used to note patients with hypothyroidism by individual interview and noting demographic data i.e. age, gender, thyroid profile (TSH, T3 and T4). Metabolic syndrome was documented using the standard set of criteria i.e. measurement of waist circumference, blood pressure measurement.3 ml of venous blood was drawn by a trained phlebotomist and sent to biochemistry laboratory for serum triglycerides, HDL cholesterol and fasting blood sugar levels.

Results: Of the 130 cases, 37.69% (n=49) were up to 50 years of age and 62.31% (n=81) had age >50 years, 28.46% (n=37) were male and (n=93)71.54% females. We found 71.54%(n=91) cases with metabolic syndrome.

Conclusion: Hypothyroidism plays an important role in MetS. Routine screening in patients with hypothyroidism may unmask MetS.

Keywords:hypothyroidism, metabolic syndrome, Fasting glucose, Diabetes type II, Triglycerides,

INTRODUCTION

Diabetes, obesity, hypertension, high triglyceride levels and low HDL cholesterol are some of the symptoms of metabolic syndrome, which is a group of metabolic disorders (HDL-C). a higher death rate as a result of cardiovascular disease and type 2 diabetes.[1]

In recent era, as the social economic is developing, the rate of nutritional metabolic disease like hypertension, diabetes and obesity are increased significantly.[2-3] A Chinese survey reveals the higher rate of metabolic syndrome in adults in China in recent past, and become a major health issue.[4-7]Overall, the prevalence rate of Metabolic Syndrome is rising while it is higher in urban than rural areas.

More people in metropolitan regions have metabolic syndrome, and the total prevalence rises with age. Gender differences are connected with the presence of risk variables as well as the prevalence of metabolic syndrome.[7-8]Due to urbanization, economic development, improved standards of living, life style changes, modified dietary routine and sedentary life style are the potential factors in this process.[4]

In metabolic regulation, thyroid hormones play an essential role. It has various effects on lipid and glucose metabolism, regulation of blood pressure and consumption of energy. Previous studies reveal a strong association of hypothyroidism and sub-clinical hypothyroidism with metabolic syndrome.[9-10] It is established that higher level of normal range of thyroid stimulating hormone are at increased obesity risk, higher triglycerides levels, and higher possibility of metabolic syndrome.[11] Healthy female population having TSG >2.5mU/L must be evaluated for the occurrence of metabolic syndrome, even in case of normal TSH range,[12] whereas some reports did not agree with this hypothesis.[13,14] Thyroid function is significantly impacted by obesity. Weight gain is associated with hypo thyroidism, and patients with a higher BMI are more likely to suffer from overt hypothyroidism, as well as subclinical hypothyroidism.[15]This association requires to be evaluated further in a larger-sample size.

Multiple researches have pointed to a connection between thyroid function and the criteria of metabolic syndrome (MetS). A range of metabolic indicators, including weight, blood pressure, and glucose metabolism, can be affected by thyroid dysfunction, which can cause or worsen MetS.[16] In this cross-sectional study, we evaluated the association of thyroid gland dysfunction with the incidence of metabolic syndrome in our local adult population.

METHODOLOGY

This cross-sectional study was conducted at Niazi Medical and Dental College, Sargodha during Nov 21 to April, 2022. We included a total of 130 diagnosed cases of hypothyroidism. Among these patients included adults of age > 18 years of either gender, non-pregnant females and having no exposure to contrast agent or iodine for the last 3 months were asked to sign a written consent form. We collected data on a pre-designed questionnaire; we collected personal and family history of thyroid disease, educational level, family income, smoking status, household salt consumption. All those cases with serum TSH>4 (Normal range TSH 0.4-4) or on treatment with thyroxin were labeled as hypothyroid cases. All known diabetics or any other endocrine disorders, renal or liver disease, old hypothyroid cases, receiving steroids, history of thyroidectomy, oral contraceptives or taking lipid lowering agent were excluded from the study.

We recorded baseline demographic data; blood pressure on sitting position was measured. Weight(kgs) and Height(cm) were measured without wearing shoes and with light clothes. Waist circumference(cm) was measured. After fasting for 12 hours, blood samples were taken and centrifuged at 2500 rpm to remove the clot. Enzymatic methods were used to assess fasting glucose, TGs, and HDL cholesterol levels.

We evaluated metabolic syndrome as per following criteria: presence of central obesity along with any 2 of the 4 factors including rise in the level of triglycerides, fall in HDL cholesterol, rise in blood pressure, and fasting plasma glucose. Any patient with waist circumference of more than 90 cm in males and more than 80 cm in females were labeled as having central obesity. Cutoff of raised triglycerides and reduced HDL cholesterol taken for this study was ≥ 150 mg/dL and less than 40 mg/dL in males and less than 50 mg/dL in females. Any patient with a systolic blood pressure of ≥ 130 or diastolic blood pressure ≥ 85 mm Hg or on treatment for hypertension was labeled as having raised BP. Any patient with fasting plasma glucose of more than 100 mg/dLor previously diagnosed type 2 diabetes was labeled as having raised fasting plasma glucose.

Data of all the patients was entered and analyzed using SPSS 23. Mean and standard deviation was calculated for all the continuous variables and frequency with %age was calculated for qualitative variables. Outcome of the study was stratified for age, gender and other effect modifiers and post stratified chi square was applied, taking p value of less than 0.05 as significant.

RESULTS

Of the 130 cases, 37.69% (n=49) were up to 50 years of age and 62.31% (n=81) had age >50 years, 28.46% (n=37) were male and (n=93)71.54% females. We found 71.54%(n=91) cases with metabolic syndrome.

Table 1:

Variables		Metabolic syndrome		P value
		Yes	No	
Age (in years)	Upto 50	41	8	0.008
	>50	50	31	
Gender	Male	29	8	0.19
	Female	62	31	

DISCUSSION

Endocrine and non-endocrine problems can be linked to metabolic syndrome, which has far-reaching consequences. Despite the fact that changes in thyroid function are well-known, clinically unrecognized, and inconsistent, in the metabolic syndrome.[17]

In this cross-sectional study, 130 diagnosed cases of hypothyroidism were enrolled; demographic variables like age, gender, thyroid profile (TSH, T3 and T4) were noted. Metabolic syndrome was documented using the standard set of criteria i.e. measurement of waist circumference, blood pressure measurement. Among these130 cases, 62.31% (n=81) had age >50 years and (n=93)71.54% females. We found 71.54%(n=91) cases with metabolic syndrome. Hypothyroidism plays an important role in MetS. Routine screening in patients with hypothyroidism may unmask MetS.

When studying the various thyroid related disorders associated with patients of metabolic syndrome, sub-clinical hypothyroidism (26.6%), overt hypothyroidism (3.5%), and subclinical hyperthyroidism (3.6%) were the most frequent endocrine disorders, respectively. Previous investigations on thyroid function in patients with metabolic syndrome have yielded similar results to ours. The most common disturbance was subclinical hypothyroidism (29.32%), followed by overt hypothyroidism (1.67 %) and subclinical hyperthyroidism (3.18%) in a research conducted in the Kavre area of central Nepal by Gyawaliet al[18]. There has been a higher incidence of thyroid dysfunction in eastern Nepal in previous investigations. Hospital based research by Baralet al.[19] and Khatiwada et al.[20] found a greater rate of thyroid diseases among the adult population, despite the lack of data from cross-sectional studies in the community.

A study conducted by Baralet al.[19] in eastern Nepal found that 13.68 % of people had hyperthyroidism, while 17.19 % had hypothyroidism. Additionally, Khatiwada et al. [20] found that 36% of diabetic patients in a major hospital in eastern Nepal had thyroid dysfunction. Thyroid autoimmunity, iodine shortage, and excess iodine have been linked to greater prevalence of thyroid dysfunction in this region.

Iodine intake among youngsters has been shown to be excessive, as evidenced by increased urine excretion of iodine.[21]A research by Shantha et al. in India reported that 21.9 % of metabolic syndrome patients had subclinical hypothyroidism and 7.4 % had overt hypothyroidism.Women are more likely than men to suffer from hypothyroidism as a result of metabolic syndrome. Hypothyroidism is more common in persons with the metabolic syndrome.[22] Furthermore, a research by Meher et al. found that 22% of patients with the metabolic syndrome had subclinical hypothyroidism, and 4% had overt hypothyroidism.[23] Older adults with normal thyroid function were found to have higher triglyceride and HDL cholesterol levels, as well as an increased risk of metabolic syndrome, according to Waring et al.

Metabolic syndrome and elevated TSH or FT4 levels were found to be unrelated. [24] Another study, concluded that metabolic syndrome is not connected with hypothyroidism because of other major variables such as age, and sex. MetS and non-MetS participants show no difference in thyroid hormone levels or incidence of TD over a 10-year period.[25]

In the end, we observed that people with metabolic syndrome had a higher prevalence of thyroid dysfunction, indicating that thyroid diseases and metabolic syndrome may be linked. Hypothyroidism was the most common thyroid disease among Pakistani individuals diagnosed with MetS. Our local population's prevalence of thyroid dysfunction and MetS will be better understood thanks to the results of this investigation.

CONCLUSION

Hypothyroidism plays an important role in the development of Metabolic Syndrome. Routine screening in patients with hypothyroidism may unmask MetS. Metabolic syndrome is more common in people with thyroid problems. Whether or not thyroid hormones contribute to metabolic syndrome is still up for debate, as is the role of gender in this relationship.

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