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RESEARCH ARTICLE
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FREQUENCY OF THYROID DYSFUNCTION IN METABOLIC SYNDROME

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ABSTRACT

Background: The goal of the study was to determine the frequency of thyroid dysfunction in metabolic syndrome that was diagnosed according to International Diabetes Federation (IDF) criteria**.**
Methods: The current study was conducted at the department of Medicine, Rai Medical College Teaching Hospital Sargodha - Pakistan from July 2022 to December 2022. In all, 306 individuals suffering from metabolic syndrome were enrolled in this investigation**.** Chemiluminescent Immunoassay (CLIA) procedure was used for thyroid function tests. Automated clinical Chemistry analyzers were used for testing the glucose and lipid profile. GOD-POD (Glucose- oxidase-peroxidase) end point Trinder's system were used for detecting glucose. Cholesterol oxidase test were used for total cholesterol measurement and by enzymatic method Triglycerides were found out through. For HDL and LDL cholesterol direct homogenous method was applied.
Results: A total of 306 patients participated in this study. The percentage of male were more (55.5%) than female (44.4%) Out of 170 male patients 44 were 30-40 years of age, 72 were of age 41-50 and 54 individuals age was 51-60 years. In male the age group 41-50 were in higher number (42.3%) compared to the age group 51-60(31.7%) and 30-40(25.8). Out of 136 females 28 were of 30-40 years of age, 44 were of 14-50 and 64 were of 51 to 60 years of age. In female patients there were more patients in age group 51-60(47%) compared to 41-50(32.3%) and 30-40(28.5%). The mean age of male 46.6 and female patients was 48.2 yrs. While comparing other variables, the mean TGL values in the male study group was found to be high compared to the female group . In both groups the values of TSH were same. Within the age group of 31-40 years had high fasting sugars (60 %) . Out of the 306 patients with metabolic syndrome, 46% had abnormal thyroid function tests. Subclinical hypothyroidism was the most common amongst, 36% and 15% of the study population had hypothyroidism, while subclinical hyperthyroidism was seen in only 4 patients (2.%) and one patient had hyperthyroidism (1%).
Conclusion: Thyroid dysfunction is reported to be prevalent in the individuals with metabolic syndrome who were the subject of the study. Subclinical hypothyroidism accounted for 37% of the study population overall and 70% of thyroid dysfunction, making it more frequent than other thyroid disorders. Patients having metabolic syndrome have a high frequency of subclinical hypothyroidism, thus one must be very suspicious of it

Keywords: Metabolic syndrome, Subclinical hypothyroidism, IDF criteria

Introduction

Metabolic syndrome is defined as a cluster of defects comprising abdominal obesity, insulin resistance, abnormal blood pressure , hyperglycemia, augmented triglycerides, and reduced high-density lipoprotein cholesterol (HDL-C) (1) . Not just in developed countries, but also in less developed ones, the prevalence of metabolic syndrome has significantly grown [2]. Nevertheless, in emerging nations as well [3, 4]. In the metabolic and endocrinology clinics, thyroid dysfunction and metabolic syndrome are frequently seen combined and Thyroid problems are more prevalent in people with metabolic syndrome, according to some research [5, 6]. The idea that triiodothyronine regulates energy and metabolic homeostasis and affects body weight, thermogenesis, lipolysis, and cholesterol metabolism has led to a recent surge in interest in the relationship between thyroid function and metabolic syndrome. (7) The metabolic disorder is a collection of risk variables that, when taken together, have a higher predictive power for illness than when taken individually. In adults, this means that may be a sign of future heart disease (and the development of type 2 diabetic mellitus .(8) Blood pressure, cholesterol and glucose metabolism, and energy balance are all significantly impacted by thyroid hormones.(9) so alteration in the function of thyroid gland is linked to metabolic syndrome and its associated mechanisms (10) therefore and thyroid-stimulating hormone (TSH) directly link with insulin resistance and indirectly with high-density lipoprotein cholesterol (11) . in the case of Hypothyroidism T3 and T4 are declined while TSH is elevated and in Subclinical hypothyroidism (SCH), TSH is high of T3 and T4 are normal than overt hypothyroidism with a prevalence of 2.4–8.8% in older asymptomatic persons and even larger percentiles . in hyperthyroidism there is decreased amount of TSH while high levels of T3 and T4. (12) The aim of the current study was to fine out the Frequency of thyroid dysfunction in metabolic syndrome.

Material and methods

The current study was conducted at the department of Medicine, Rai Medical College Teaching Hospital, Sargodha - Pakistan from July 2022 to December 2022 on outdoor and indoor patient diagnosed with metabolic syndrome

Inclusion criteria According to the International Diabetes Federation, waist circumference—which was measured ethnically-specifically midway between the most prominent borders of the iliac crest and the lowermost border for the lower part of the costal margin for men with a circumference of over ninety cm and more than 80 centimeters for women—was one of the included criteria. Additionally any of the two criteria (Triglycerides) ≥ 150 mg/dl ,High Density Cholesterol ≤ 40 mg/dl in men, 50 mg/dl in women Systolic blood pressure ≥130 mm of Hg Diastolic blood pressure ≥ 85 mm of Hg and Fasting Blood Sugar ≥ 100 mg/dl were included in the study

Exclusion criteria patients had Gestational Diabetes Mellitus. Type 1 diabetes and overt diabetes or those who were on Oral Contraceptive Pills, pancreatitis history and those who were formerly identified of thyroid disorder and on treatment were excluded. A thorough antiquity was taken from all patients encompassed in the current study regarding signs of thyroid dysfunction and analysis was accepted out as per the proforma . Chemiluminescent Immunoassay (CLIA) procedure was used for thyroid function tests. Automated clinical Chemistry analyzers were used for testing the glucose and lipid profile. GOD-POD (Glucose- oxidase-peroxidase) end point Trinder's system were used for detecting glucose. Cholesterol oxidase test were used for total cholesterol measurement and by enzymatic method Triglycerides were found out through. For HDL and LDL cholesterol direct homogenous method was applied

RESULTS

A total of 306 patients participated in this study in which there were 170 male and 136 female .The percentage of male were more (55.5%) than female (44.4%)Out of 170 male patients 44 were 30-40 years of age, 72 were of age 41-50 and 54 individuals age was 51-60 years. In male the age group 41-50 were in higher number (42.3%) compared to the age group 51-60(31.7%) and 30-40(25.8). **(FIG**

1) Out of 136 females 28 were of 30-40 years of age, 44 were of 14-50 and 64 were of 51 to 60 years of age**.(FIg No 2)** In female patients there were more patients in age group 51-60(47%) compared to 41-50(32.3%) and 30-40(28.5%) The mean age of male 46.6 and female patients was 48.2 yrs. While comparing other variables, the mean TGL values in the male study group was found to be high (184) compared to the female group (164). In both groups the values of TSH were same. Of total 306 patients with metabolic syndrome, 36 (male -19 and female - 17) of them symptoms related to hypothyroidism. Of the 306 patients, 21 had goitre on examination. 19 had diffuse goiter and 4 patients had multinodular goiter. In the age group of 41-50 had more number of patients with abnormal TGL values, matched to the other age groups. While, HDL values were low in the 51-60 age group related to others. Within the age group of 31-40 years had high fasting sugars (60 %) compared to that of 41-50 years (31%) and 43% in 51-60 years. Irregular PPBS values were observed in the age group of 41-50 was 90%, where as it is 84% in 31-40 years age group and 73% in the 51-60 years

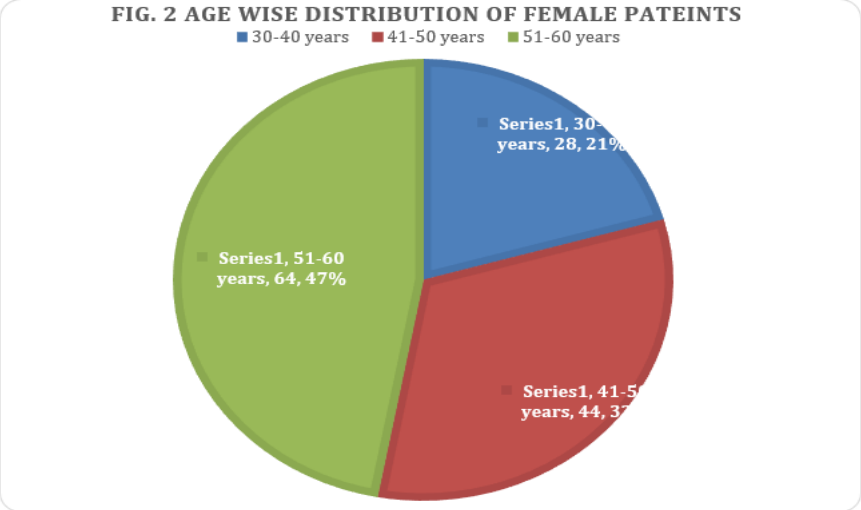
Out of the 306 patients with metabolic syndrome, 46% had abnormal thyroid function tests. Subclinical hypothyroidism was the most common amongst, 36% and 15% of the study population had hypothyroidism, while subclinical hyperthyroidism was seen in only 4 patients (2.%) and one patient had hyperthyroidism (1%). As per age wise sharing it is seen that, subclinical hypothyroidism is the most predominant thyroid dysfunction in all age groups. Hypothyroidism is seen in 18% of the 51 to 60 age group and it was 14% in both 31 to 40 and 41-50 age groups. Only one patient in the age group of 41-50 had hyperthyroidism. Subclinical hyperthyroidism is seen in 2.45 in 31-40 and 2.7 % in the 41 to 50 age group, none in the 51 to 60 years

The overall incidence of thyroid dysfunction in the present study was were subclinical hypothyroidism n=114 (37.2%), hypothyroidism n= 44(14.3), Euthyroidism n= 140(45.7), and subclinical hyper thyroidism n= 5(1.63 %) hyperthyriodism n=3(0.9 %) as presented in **table 1 .**Prevalence of thyroid dysfunction in male patients were subclinical hypothyroidism n=66 (38.8%), hypothyroidism n= 22(12.9%), Euthyroidism n= 77(45.2), subclinical hyper thyroidism n= 4(2.3%)and hyper thyroidism n= 1(0.3%) as displayed in **table 2.** Female thyroid dysfunction in female patients were subclinical hypothyroidism n=49 (36.%), hypothyroidism n= 23(16.9), Euthyroidism n= 63(46.2), and subclinical hyper thyroidism n= 1(0.7 %) as presented in **table 3.** On comparing, individual variables of metabolic syndrome with respect to thyroid values, displays that

1) Mean systolic blood pressure is in elevation in patients with hypothyroidism (139.55), while it is nearly the similar in the subclinical hypothyroidism and euthyroid group.

2) While, the mean diastolic blood pressure is extraordinary in mutually hypothyroid (90.75) and subclinical Hypothyroidism (88.37), related to that of the euthyroid group who have a mean diastolic BP of 82 mm of Hg.

3) In the hypothyroid group Triglycerides values are high , mean value of 180 (SD - 49), however it is 168 in the euthyroid group and 171 in the subclinical hypothyroidism



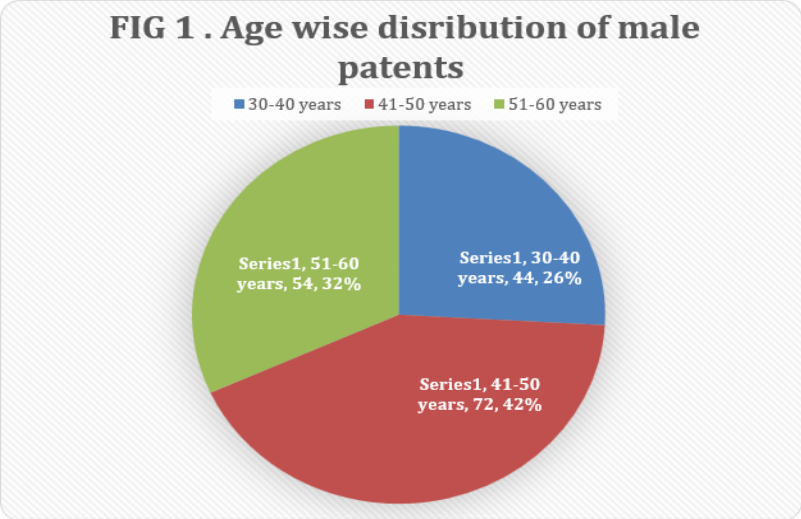


Table 1 Over all Prevalence of thyroid dysfunction		
	Frequency	**%**
Subclinical hypothyroidism	114	37
Hypothyroidism	44	14.3
Euthyroidism	140	45.7
Subclinical hyperthyroidism	5	1.63
Hyperthyroidism	3	0.9

Table 2 Over all Prevalence of thyroid dysfunction in female		
	Frequency	**%**
Subclinical hypothyroidism	49	36
Hypothyroidism	23	16.9
Euthyroidism	63	46.2
Subclinical hyperthyroidism	1	0.7
Total	136	100

Table 2 Over all Prevalence of thyroid dysfunction in male		
	Frequency	**%**
Subclinical hypothyroidism	66	38.8
Hypothyroidism	22	12.9
Euthyroidism	77	45.2
Subclinical hyperthyroidism	4	2.3
hyper thyroidism	1	0.3
Total	170	100

Discussion

A collection of risk factors for the emergence of cardiovascular disease is known as metabolic syndrome. Numerous previous studies have indicated increased rates of link between metabolic syndrome and subclinical hypothyroidism, or thyroid malfunction. (13,14) Therefore, treating thyroid problems in people with metabolic syndrome may help lower their already-present risk of cardiovascular disease.

Prevalence and spectrum of thyroid dysfunction in metabolic syndrome (Table 1) We have found that out of the 306 patients, 166 had abnormal thyroid values. of which most of them had subclinical hypothyroidism (37.2%), followed by hypothyroidism (14%) of the study. Similar study was conducted by Gyawali et al. in patients with metabolic syndrome in which 128 patients were studied in which the prevalence of thyroid gland dysfunction was 31.25% , and 28.90% had subclinical hypothyroidism, 1.55% had overt hyperthyroidism, 0.80% had subclinical hyperthyroidism, and 68.75% were euthyroid. Overt hypothyroidism was totally absent. Thyroid

function in frequency and occurrence of metabolic syndrome in older adults, which presented that the greater TSH levels more than 10 mIU/ml were more frequently related with prevalent metabolic syndrome.(16) A study about metabolic syndrome from euthyroid population of pakistan investegated a substantial difference in TSH levels between two groups (17) According to Jayakumar et al. , out of 120 individuals with metabolic syndrome, 60% exhibited problems related to the thyroid. Out of the study group, 52 patients (or 44%), 18 patients (15%) had hypothyroidism, 2 patients had subclinical hyperthyroidism, and 48 patients had normal readings.(18)

study conducted at Taiwan University Hospital, Chih Yuan Wang et al., included 9055 subjects for evaluation. These subjects were divided into three groups: subclinical hyperthyroidism (239 patients), euthyroidism (8404 patients), and subclinical hypothyroidism (412 patients). The study's findings demonstrated that there isn't a statistically significant link between subclinical hypothyroidism and metabolic syndrome.(19) A population-based study, included 914 women with hypothyroidism; of them, 19.2% had subclinical hypothyroidism; in our study, large number of of the female patients had hypothyroidism.(20) . a research. study, which involved 2205 postmenopausal euthyroid women, found a strong correlation between TSH levels and metabolic syndrome. Greater TSH values indicate a higher incidence of metabolic syndrome.(21) A study examined the relationship between thyroid disorders and metabolic syndrome in 48 Nepalese girls. The research population included 32% of people with metabolic syndrome. Among whom, the euthyroid group had a higher frequency of metabolic syndrome than the hyperthyroid and hypothyroid groups did(22). This study contradicts our findings by suggesting that thyroid dysfunction may protect against the development of metabolic syndrome.

Researchers Chih Cheng Lai 15 et al. looked researched the incidence of subclinical hypothyroidism in older Taiwanese adults and how it related to the metabolic syndrome. According to this study, 28% of those diagnosed with subclinical hyperthyroidism and 32% of those surveyed with subclinical hypothyroidism had metabolic syndrome.(23) . conducted a research on 1333 German individuals without therapy, whose TSH readings ranged from 0.3 to 4.5 mu/L. According to the study's findings, individuals with high normal TSH levels had significantly greater TGL levels than those with lower TSH values and higher BMIs, and they also had a 1.7-fold higher chance of developing the metabolic disorder.(24)

CONCLUSION

Thyroid dysfunction is reported to be prevalent in the individuals with metabolic syndrome who were the subject of the study. Subclinical hypothyroidism accounted for 37% of the study population overall and 70% of thyroid dysfunction, making it more frequent than other thyroid disorders. The incidence of subclinical hypothyroidism was greater in patients aged 30–40 years than in those aged 41–50 years and 51–60 years. Patients having metabolic syndrome have a high frequency of subclinical hypothyroidism, thus one must be very suspicious of it.

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