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Original research article

FREQUENCY OF THYROID DYSFUNCTION IN CASES OF METABOLIC SYNDROME PRESENTING AT TERTIARY CARE HOSPITAL

HUDA NU*, ALI UA, ABBASI W

Department of Medicine, Ayub Teaching Hospital Abbottabad, Pakistan
**Correspondence author email address:* noorshabir55@gmail.com

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Abstract: *Metabolic syndrome is a cluster of conditions that increase the risk of heart disease, stroke, and diabetes. Thyroid dysfunction is frequently observed in patients with metabolic syndrome, impacting their overall health outcomes.* ***Objective:*** *To determine the frequency of thyroid dysfunction in patients with metabolic syndrome.* ***Methods:*** *This cross-sectional study was conducted at the Department of Medicine, Ayub Teaching Hospital, Abbottabad, from September 2023 to March 2024. A total of 120 patients diagnosed with metabolic syndrome were included. The patients' thyroid function was assessed through clinical evaluation and laboratory tests, including serum levels of TSH, free T3, and free T4. Statistical analysis was performed using descriptive statistics to determine the frequency of thyroid dysfunction, with results expressed as percentages and means ± standard deviations.* ***Results:*** *The average age of the 120 patients was 44.64±9.01 years. The frequency of thyroid dysfunction among these patients was 68.4% (82/120). Subclinical hypothyroidism was present in 27.5% (33/120), hypothyroidism in 14.2% (17/120), and subclinical hyperthyroidism in 4.2% (5/120).* ***Conclusion****: The study found a high frequency of thyroid dysfunction (68.4%) in patients with metabolic syndrome, with subclinical hypothyroidism being the most prevalent form. These findings highlight the importance of regular thyroid function screening in patients with metabolic syndrome to ensure early diagnosis and management.*

Keywords: Metabolic Syndrome, Thyroid Dysfunction, Subclinical Hypothyroidism

Introduction

Metabolic syndrome is a collection of many conditions that increase the likelihood of developing atherosclerotic cardiovascular disease, such as heart attacks, strokes, peripheral vascular diseases, and resistance to insulin, including type II diabetes mellitus (1). Metabolic syndrome is characterized by a group of metabolic illnesses, namely central obesity, insulin resistance, hypertension, as well as atherogenic dyslipidemia. Individuals diagnosed with metabolic syndrome have a twofold higher likelihood of developing atherosclerotic cardiovascular illnesses and a fivefold higher likelihood of developing diabetes mellitus, in comparison to the general population (2).

Metabolic syndrome is additionally linked to hastened atherosclerosis, premature development of atherosclerotic cardiovascular illnesses, and early start of type II diabetes mellitus (3, 4). The lack of physical activity and overconsumption of calories have greatly contributed to the rise in obesity rates among the population in recent decades (5). The rapid increase in population obesity has led to a large rise in the occurrence of metabolic syndrome over the past 20 years (6). Presently, a proportion exceeding twenty per cent of Americans, in addition to the populace of Europe, are afflicted with metabolic syndrome. Central obesity is the main factor of metabolic syndrome, which results in insulin resistance, hypertension, as well as dyslipidemia (7).

Thyroid diseases are linked to atherosclerotic cardiovascular disease. This relationship can be partially elucidated by the role of thyroid hormones in regulating lipid metabolism and their impact on blood pressure. Thyroid hormones exert widespread impacts and impact the function of nearly all organs. This hormone seems to function as a universal regulator, speeding up the rate of metabolism and potentially being linked to metabolic syndrome (8). Metabolic syndrome with thyroid dysfunction both correlate with a higher likelihood of developing atherosclerotic heart disease. Thyroid impairment, particularly subclinical hypothyroidism, is more commonly detected in people with metabolic syndrome compared to the general population (9). Metabolic syndrome with hypothyroidism are separate risk factors underlying cardiovascular diseases (10). The coexistence of these illnesses might exacerbate the risk for cardiovascular disease, and there is significant overlap in the underlying mechanisms of atherosclerosis, which is caused by metabolic syndrome and hypothyroidism (11).

Gaining a comprehensive understanding of how thyroid function and metabolic syndrome interact with each other could provide significant knowledge on the development of diseases, techniques for diagnosis, and interventions for treatment. This study seeks to fill the gaps in knowledge by examining the frequency, factors that increase the likelihood, and medical results linked to thyroid dysfunction in individuals with metabolic syndrome. The ultimate goal is to contribute to the progress of personalized medicine and focused interventions for this at-risk population.

Methodology

A cross-sectional study was conducted from September 2023 to March 2024 at the Department of medicine after obtaining ethical approval from Ayub Teaching Hospital, Abbottabad. One hundred and twenty patients presenting with metabolic syndrome after examining their history and laboratory reports were selected. The age range was 30 to

60 years and we included patients of both genders. Patients with metabolic syndrome were diagnosed with thyroid dysfunction if their thyroid hormone levels (TSH level, 0.25–5 mIU/L), free T4 (9.0–20.0 pmol/L), and free T3 (4.0–8.3 pmol/L) were not within the standard range. If every patient's thyroid hormone level was within the reference range, they were considered euthyroid. TSH > 5 mIU/L, free T3 < 4.0 pmol/L, and free T4 < 9.0 pmol/L were considered indicators of overt hypothyroidism. When TSH was greater than 5 mIU/L and free T3 and free T4 were within the reference range, subclinical hypothyroidism was diagnosed. Free T3 and free T4 within reference range, and TSH less than 0.25 mIU/L were the criteria for subclinical hyperthyroidism. SPSS version 25 was used to analyze the study's data.

Results

The mean age of one hundred and twenty patients was 44.64±9.01 years. The mean BMI was 28.26±2.17 Kg/m^2. The figure presents the gender distribution of our patients which shows that the frequency of female patients was a little higher than male patients. About 38 (31.7%) patients belonged to the lower class having income < 50000 PKR/month. Around 60 (50%) patients were from the middle class having an income of 50000 to 80000 PKR/month while 22 (18.3%) patients were from the upper class having an income > 80000 PKR/month. The frequency of thyroid dysfunction in our study turned out to be 82 (68.4%). Classification of thyroid dysfunction showed that subclinical hypothyroidism was 33 (27.5%), hypothyroidism was 17 (14.2%) and subclinical hyperthyroidism was 5 (4.2%). We found a notable association between the classification of thyroid dysfunction and gender (P = 0.05).

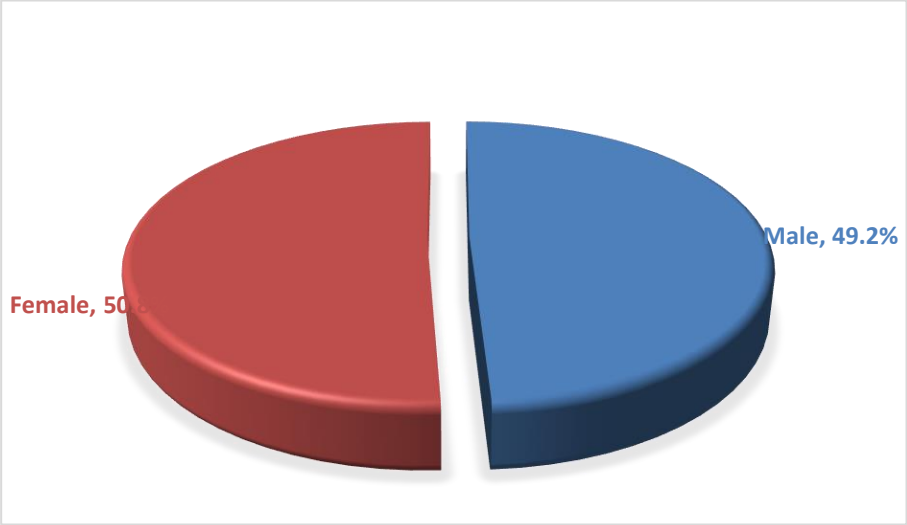

Figure 1 Gender distribution

Table 1 Classification of Thyroid Dysfunction

Classification of thyroid dysfunction	Frequency	Percent
Subclinical hypothyroidism	33	27.5
Hypothyroidism	17	14.2
Euthyroidism	27	22.5
Subclinical hyperthyroidism	5	4.2
Total	82	68.4

Table 2 Association between classifications of thyroid dysfunction with gender

		Gender		Total	*P*-value
		Male	Female		
Thyroid Dysfunction	Subclinical hypothyroidism	10	23	33	0.05
		30.3%	69.7%	100.0%	
	Hypothyroidism	9	8	17	
		52.9%	47.1%	100.0%	
	Euthyroidism	12	15	27	
		44.4%	55.6%	100.0%	
	Subclinical hyperthyroidism	3	2	5	
		60.0%	40.0%	100.0%	
	No Thyroid Dysfunction	25	13	38	
		65.8%	34.2%	100.0%	
Total		59	61	120	
		49.2%	50.8%	100.0%	

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Discussion

The actions of thyroid hormones result in particular consequences that have an impact on endpoints such as the amount of fat stored in the body, the levels of glucose or lipids, and blood pressure. By doing so, TH levels can affect all four characteristics of MetS. There have been several studies that have cast doubt on the impact that thyroid hormones have on metabolic syndrome parameters (12). The majority of these studies have favoured the relationship between elevated serum TSH and lower serum FT4 levels, even when considering the range of reference, with metabolic parameters or MetS as a whole. On the other hand, there have been reports that have found no relationship between thyroid hormones and metabolic parameters.(13)

Based on the evidence that is currently available, the relation between thyroid hormones and each of the components of MetS may not necessarily be unidirectional. This is because the tissue targets of thyroid hormones are also connected with thyroid function (14). Additional research is required in this area to determine the cause-and-effect relationships that exist between these two factors. In light of the evidence that suggests that certain components of MetS affect thyroid hormones, particularly about obesity and diabetes, the hypothesis has been formulated.(15)

Up until quite recently, more new perspectives suggested that thyroid issues could be secondary to obesity. This is even though weight gain is commonly considered to be a secondary factor in hypothyroidism. The explanation may be due to a chronic inflammation status that is caused by leptin, cytokines, and other markers of inflammation that are produced by over-loading adipose tissue (16). These inflammatory markers may inhibit the messenger RNA (mRNA) expression of sodium/iodide symporter and disturb the absorption of iodide activity in thyroid cells, or they may modulate the expression as well as the function of deiodinases. However, the pathophysiology of the association between hypothyroidism and obesity still has to be better understood before further research being conducted.(17)

We conducted our study on 120 patients presenting with metabolic syndrome, we observed that the mean age of the patients was 44.64±9.01 years while BMI indicated that most of the patients were overweight. The frequency of female patients was a little higher than the frequency of male patients.

In our study, we observed that the frequency of thyroid dysfunction was 82 (68.4%), the break up of the TD revealed that the frequency of subclinical hypothyroidism was 33 (27.5%) followed by euthyroidism was 27 (22.5%) while hypothyroidism was found in 17 (14.2%) patients. According to our findings, a study showed that they found a higher frequency of subclinical hypothyroidism among all classifications of TD they found in their patients[18]. Another study also reported that subclinical hypothyroidism was found to be higher in patients with metabolic syndrome.(18) We observed that TD was more frequent in the female patients as compared to the males, similar observation has been reported in the aforementioned study.(19)

Conclusion

In conclusion, the frequency of thyroid dysfunction in our study was 82 (68.4%) in patients with metabolic syndrome. Subclinical hypothyroidism was the most frequent presentation of thyroid dysfunction.

Declarations

Data Availability statement
All data generated or analyzed during the study are included in the manuscript.
Ethics approval and consent to participate.
Approved by the department concerned. (IRB/ATAB-454/10.23)
Consent for publication
Approved
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Conflict of interest

The authors declared an absence of conflict of interest.

Authors Contribution

NOOR UL HUDA (House Officer)
Final Approval of version & Drafting
UMAR AZAM ALI (House Officer)
Revisiting Critically & Data Analysis
WALEED ABBASI (House Officer)
Concept & Design of Study

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