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FREQUENCY OF GOITER BASED THYROID DYSFUNCTION AMONG PATIENTS OF CARDIOVASCULAR DISEASES

Badar Javed[a], Arslan Ahmed[b], Muhammad Usman[c], Sajjad Ahmed[b], Shahzad Majeed Bhatti[d], Afsheen Nigar[d]

[a]Omar Hospital and Cardiac Centre, Lahore. [b]Punjab Institute of Cardiology, Lahore. [c]Shalamar Institute of Health Sciences, Lahore, [d]King Edward Medical University, Lahore

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ABSTRACT:

BACKGROUND: *It has been consistently noted that overt hypothyroidism is linked to an increased risk of developing coronary heart disease. Myocardial infarction risk in women was shown to be independently increased by subclinical hypothyroidism. Elevated thyroid antibodies are the hallmark of autoimmune thyroid disease (AITD), the leading cause of hypothyroidism. Therefore, a rise in thyroid antibodies alone may affect cardiovascular risk. The purpose of this research was to assess the prevalence of thyroid dysfunction attributable to goitres in people with cardiovascular illnesses.*

AIMS & OBJECTIVE: *To assess the effect of thyroid dysfunction in patients with cardiovascular disorders.*

MATERIAL & METHODS: *The research was carried out between October 25th, 2020 and April 25th, 2021 at the Punjab Institute of Cardiology in Lahore. In all, 150 heart disease patients were included. A sterile blood sample was drawn using a disposable syringe. The samples were then forwarded to the hospital laboratory where the TSH and T4 levels would be determined. The reports were evaluated, and the results were tallied. Operational definition was used to provide labels for overt hypothyroidism, subclinical hypothyroidism, and hyperthyroidism. The information was put into SPSS v25.0 for statistical analysis. The Chi-square test was used to evaluate the differences between the subgroups with respect to goitre and thyroid dysfunction. All p-values below 0.05 were considered significant.*

RESULTS: *Total 150 patients with cardiovascular diseases were enrolled in the study. Gender distribution showed that 95(63.3%) were males while 55(36.7%) were females. Among 150 patients with cardiovascular diseases, 29(19.3%) had goiter and thyroid dysfunction. Among patients with goiter 9(6.0%) had overt hypothyroidism, 15(10.0%) had subclinical hypothyroidism and 5(3.3%) had hyperthyroidism.*

CONCLUSION: *The presence of thyroid dysfunction must be regarded as a relatively widespread disorder, particularly among females. This condition has the potential to add to the total risk of coronary disease and may be treated by secondary preventive measures.*

KEY WORDS: *Cardiovascular Diseases, Goiter Based Thyroid Dysfunction.*

Correspondence : Badar Javed, Omar Hospital and Cardiac Centre, Lahore. Email: drbaderjaved89@hotmail.com
Author's Contribution: BJ: Data collection, study design, concept. AA: Data analysis. MU: Data collection. SA: Literature search. SMB: Questionair design. AN: Data collection.

INTRODUCTION:

It has been known for a very long time that thyroid hormones may have a variety of impacts on the cardiovascular system. There are, however, major information gaps about the specific molecular and biochemical processes that regulate these effects and the appropriate techniques for care of anomalies in thyroid function in patients both with and without prior cardiovascular disease. These knowledge gaps exist in both the medical and scientific communities. The frequency of subclinical hyperthyroidism in the general population is estimated to be between 1% and 2%; however, it may be greater in regions where there is a lack of iodine.[1-2]

Hypothyroidism is a prevalent clinical disorder with a wide range of incidence rates. Significant changes in cardiac contractility, vascular resistance, blood pressure, and heart rhythm may result from its administration. higher resting heart rate, higher risk of atrial arrhythmias and heart failure, increased left ventricular mass and diastolic dysfunction, and decreased heart rate variability are all cardiovascular outcomes of subclinical hyperthyroidism. The incidence of cardiovascular events was greater in adults over the age of 65 with subclinical hyperthyroidism compared to euthyroid persons.[3-4]

In both the general population and individuals with heart illness, hypothyroidism is linked to increased risks of cardiac mortality and all-cause mortality compared with euthyroidism. Research into the therapeutic value of pharmacological intervention for persons with increased TSH concentrations is warranted since cardiovascular disease mediated the connection between subclinical hypothyroidism and all-cause death. The effects of mild, moderate, and severe thyroid dysfunction on the cardiovascular system are still up for debate.[5-7]

It has been reported in a study that thyroid dysfunction was detected in 16.8% cases, out of which, subclinical hypothyroidism was present in 7.1%, overt hypothyroidism in 4.1% and hyperthyroidism in 5.6% cases of cardiovascular diseases.8 Rationale of this study is to determine the frequency of goiter based thyroid dysfunction among patients of cardiovascular diseases. It has been observed through literature that the thyroid dysfunction can be present in major number of patients of cardiovascular disease.

But still there is a need to conduct studies to find the evidence for local population. Thyroid dysfunction has been associated with cardiovascular disease. So, it is considered as a risk factor for development cardiovascular diseases. But not much work has been done in this regard and no local data available in literature. So we want to conduct this study to get local evidence which could help us in implementation of screening of thyroid function to determine the risk of cardiovascular disease in local setting. This will help us to alter the therapeutic strategy and better prognosis of cardiovascular diseases patients.

METHODOLOGY:

The study was conducted at Department of Cardiology, Punjab Institute of Cardiology, Lahore from October 25, 2020 to April 25, 2021. Total 150 patients with cardiovascular diseases were enrolled. Sample size of 150 patients was calculated by using 95% confidence level with 6% margin of error and taking expected percentage of thyroid dysfunction i.e. 16.8% in patients of cardiovascular diseases.[8]

The inclusion criteria was patients of ages between 35-85 years, either gender and patients diagnosed with cardiovascular diseases presenting for routine check-up with neck swelling. The exclusion criteria were patients taking treatment for thyroid dysfunction before diagnosis of cardiovascular disease (on medical record), patients with thyroidectomy (complete or partial), patients with valvular or rheumatic heart disease, stenosis or regurgitation, congenital heart disease, congestive heart failure (on medical record) and patients with h/o alcohol, IV drug user, use of narcotics.

The participants gave their permission voluntarily and understandingly. Name, age, gender, body mass index, diagnosis and treatment of cardiovascular disease, smoking status, and diabetes were recorded. Then, a sterile blood sample was drawn using a single-use syringe. The samples were then forwarded to the hospital laboratory where the TSH and T4 levels were determined.

Reports were assessed and levels were noted. If TSH and T4 level are disturbed, then goiter based thyroid dysfunction i.e. TSH>3.65mIU/L & fT4<9.0pmol/L, then overt hypothyroidism, if TSH>3.65mIU/L and fT4 9.0–23.0pmol/L then subclinical hypothyroidism; if TSH<0.58mIU/L then hyperthyroidism, were labelled as per operational definition.

Cardiovascular diseases was defined as presence of coronary artery disease (>50%

Table-1: Frequency distribution of demographic variables		
Gender	**Frequency**	**Percent**
Male	95	63.3
Female	55	36.7
Age groups		
35-50 years	20	13.3
51-65 years	100	66.7
>65 years	30	20.0
BMI		
Normal	80	53.3
Overweight	60	40.0
Obese	10	6.7
Diabetes		
Yes	75	50.0
No	75	50.0
Smoking		
Yes	70	46.7
No	80	53.3
Duration of disease		
≤1 year	80	53.3
>1 year	70	46.7
Goiter based thyroid dysfunction		
Yes	29	19.3
No	121	80.7
Overt hypothyroidism		
Yes	9	6.0
No	141	94.0
Subclinical hypothyroidism		
Yes	15	10.0
No	135	90.0
Hyperthyroidism		
Yes	5	3.3
No	145	96.7
Treatment of cardiovascular disease		
Loprin	45	30.0
Statins	30	20.0
ACEI and ARBS	60	40.0
Beta blockers	15	10.0

Table-2: Stratification of goiter based thyroid dysfunction with respect to different variables				
Variables		Goiter based thyroid dysfunction		p-value
		Yes	No	
Age groups	35-50 years	5(25.0%)	15(75.0%)	0.757
	51-65 years	19(19.0%)	81(81.0%)	
	>65 years	5(16.7%)	25(83.3%)	
Gender	Male	15(15.8%)	80(84.2%)	0.149
	Female	14(25.5%)	41(74.5%)	
BMI	Normal	10(12.5%)	70(87.5%)	0.051
	Overweight	14(23.3%)	46(76.7%)	
	Obese	5(50.0%)	5(50.0%)	
Diabetes	Yes	20(26.7%)	55(73.3%)	0.053
	No	9(12.0%)	66(88.0%)	
Smoker	Yes	10(14.3%)	60(85.7%)	0.143
	No	19(23.8%)	61(76.3%)	
Duration of disease	≤1 year	10(12.5%)	70(87.5%)	0.053
	>1 year	19(27.1%)	51(72.9%)	

stenosis on angiography) or ischemic heart disease (BP140/90mmg) with abnormal ECG). Goiter based thyroid dysfunction was labeled when TSH >3.65mIU/L & fT4 <9.0pmol/L as overt hypothyroidism, if TSH >3.65mIU/L and fT4 9.0–23.0pmol/L as subclinical hypothyroidism; if TSH<0.58mIU/L as hyperthyroidism in patients with neck swelling due to enlargement of thyroid gland.

The information was put into SPSS v25.0 for statistical analysis. Mean and standard deviation were provided for quantitative factors such as age, body mass index, duration of cardiovascular disease, and TSH and T4 levels. Gender, smoking, diabetes, cardiovascular disease therapy, and goitre-based thyroid dysfunction were some of the qualitative factors that were provided as frequencies and percentages. Age, gender, body mass index, illness duration, therapy for cardiovascular disease, smoking, and diabetes were used to separate the data. The effects of goitre on thyroid function were compared between stratified groups using the chi-square test. All p-values below 0.05 were considered significant.

RESULTS:

Total 150 patients with cardiovascular diseases were enrolled in the study. Gender distribution showed that 95(63.3%) were males while 55(36.7%) were females. The mean age of the patients was 55.53±14.90 year. According to age distribution, 20(13.3%) of the patients had ages between 35-50 years, while 100(66.7%) and 30(20.0%) patients had ages between 51-65 years and >65 years respectively.

The mean BMI of the patients was 27.25±8.34 kg/m^2. According to body mass index, 80(53.3%) had normal weight, while 60(40.0%) and 10(6.7%) were overweight and obese respectively. Among 150 patients with cardiovascular diseases, 75(50.0%) were diabetic, while 70(46.7%) were smokers. The mean duration of disease was 2.5±1.41 years. According to duration of disease distribution, 80(53.3%) of the patients had disease for ≤1 year, while 70(46.7%) patients had disease for >1 year.

Mean TSH level was 1.65±0.54 (mIU/L) and mean T4 level was 13.9±0.77 (pmol/L). Among 150 patients with cardiovascular diseases, 29(19.3%) had goiter based thyroid dysfunction. Among patients with goiter based thyroid dysfunction, 9(6.0%) had overt hypothyroidism, 15(10.0%) had subclinical hypothyroidism and 5(3.3%) had hyperthyroidism.

According to treatment of disease, 45(30.0%) treated with Loprin, while 30(20.0%), 60(40.0%) and 15(10.0%) were treated with Statins, ACEI and ARBS and beta blockers respectively. According to stratification of goiter based thyroid dysfunction with respect to gender, age, BMI, diabetes, smoking and duration of disease, insignificant difference was

observed between either gender (p>0.05).

DISCUSSION:

Although hypothyroidism may have several causes, the vast majority of cases are attributable to primary thyroid gland failure as a result of either chronic autoimmune thyroiditis, radioactive iodine treatment, or surgical removal of the thyroid. Most cases of hypothyroidism occur after a thyroidectomy or are the result of some other underlying congenital condition. The symptoms of hypothyroidism are often vague, and similar to hyperthyroidism, it may lead to heart problems. Patients with hypothyroidism may present with symptoms such as sensitivity to cold, mental slowness, and constipation.

Overall, we identified a prevalence of 16% of hypothyroidism in this research. Females were affected nearly 1.5 times more often than men (15.8% vs. 25.5%). Hypothyroidism was found to affect 6.8% of men and 13.8% of females in the overall population in the same location. About 5% of the general population has either subclinical or overt hypothyroidism, according to a meta-analysis of 12 community-based research. It was shown that the incidence of hypothyroidism was highest in women between the ages of 45 and 60.[9-11]

Our sample found no significant difference in the frequency of hypothyroidism between women aged >50 and those younger than 50. Therefore, women of any age with coronary heart disease should get a thyroid function check. Most research has linked hypothyroidism to increased total and LDL cholesterol in the blood, making it a risk factor for cardiovascular disease diminished catabolism of lipoproteins in hypothyroidism may be the cause of hypercholesterolemia. This may be due to diminished expression of lipoprotein receptors.[12]

In both the general population and individuals with heart illness, hypothyroidism is linked to increased risks of cardiac mortality and all-cause mortality compared with euthyroidism. Research into the therapeutic value of pharmacological intervention for persons with increased TSH concentrations is warranted since cardiovascular disease mediated the connection between subclinical hypothyroidism and all-cause death. The effects of mild, moderate, and severe thyroid dysfunction on the cardiovascular system are still up for debate.[5-7]

In this study, among 150 patients with cardiovascular diseases, 29(19.3%) had goiter based thyroid dysfunction. Among patients with goiter based thyroid dysfunction, 9(6.0%) had overt hypothyroidism, 15(10.0%) had subclinical hypothyroidism and 5(3.3%) had hyperthyroidism. It has been reported in a study that thyroid dysfunction was detected in 16.8% cases, out of which, subclinical hypothyroidism was present in 7.1%, overt hypothyroidism in 4.1% and hyperthyroidism in 5.6% cases of cardiovascular diseases.[8]

CONCLUSION:

The presence of thyroid dysfunction must be regarded as a relatively widespread disorder, particularly among females. This condition has the potential to add to the total risk of coronary disease and may be treated by secondary preventative measures.

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