OTJHS
Online Turkish Journal of Health Sciences

e-ISSN: 2459-1467

OTSBD
Online Türk Sağlık Bilimleri Dergisi

Online Turkish Journal of Health Sciences 2023;8(3):345-349 *Online Türk Sağlık Bilimleri Dergisi 2023;8(3):345-349*

Evaluation of Thyroid Dysfunction in Patients with Atrial Fibrillation

Atrial Fibrilasyonu olan Hastalarda Tiroid Fonksiyon Bozukluğunun Değerlendirilmesi

[1]Perihan VARIM, [2]Taner DEMİRCİ

[1]Medical Doctor; Department of Cardiology. Sakarya University Research and Education Hospital, Sakarya, Türkiye
[2]Associate Professor, Department of Endocrinology and Metabolism, Sakarya University Faculty of Medicine, Sakarya, Türkiye

Perihan Varim: https://orcid.org/0000-0002-8827-1280
Taner Demirci: https://orcid.org/0000-0002-9579-4530

ABSTRACT

Objective: Atrial fibrillation is a common cardiac arrhythmia and is an important risk factor for ischemic stroke and heart failure. Thyroid hormones have important effects on the cardiovascular system. In this study, we aimed to evaluate the relationship between atrial fibrillation (AF) and thyroid disorders.

Materials and Methods: 587 newly diagnosed AF patients who applied to the Cardiology Clinic between January and December 2022 were included in this study. Thyroid function tests of the patients were examined.

Results: The mean age of the patients included in the study was 62.2 ± 9.8 years. 62% of the patients were female, and 38% were male. Euthyroid in 539 patients (91.7%), hypothyroidism in 2 patients (0.3%), subclinical hypothyroidism in 11 patients (2%), hyperthyroidism in 23 patients (3.9%), and subclinical hyperthyroidism in 12 patients (2.1%).

Conclusion: Atrial Fibrillation is associated with both hyperthyroidism and hypothyroidism. Thyroid dysfunctions are more common in patients with AF than in the normal population. Patients with AF should be screened for thyroid disorders.

Keywords: Atrial Fibrillation, hyperthyroidism, hypothyroidism

ÖZ

Amaç: Atriyal fibrilasyon yaygın bir kardiyak aritmidir ve iskemik inme ve kalp yetmezliği için önemli bir risk faktörüdür. Tiroid hormonlarının kardiyovasküler sistem üzerinde önemli etkileri vardır. Bu çalışmada atrial fibrilasyon (AF) ile tiroid bozuklukları arasındaki ilişkiyi değerlendirmek amaçlandı.

Materyal ve Metot: Bu çalışmaya Ocak – Aralık 2022 arasında Kardiyoloji Kliniğine başvuran yeni tanı almış 587 AF'li hasta alındı. Hastaların tiroid fonksiyon testleri incelendi.

Bulgular: Çalışmaya alınan hastaların yaş ortalaması 62.2 ± 9.8 idi. Hastaların %62'si kadın %38'i erkekti. 539 hasta ötiroid (%91,7), 2 hastada hipotiroidi (%0,3), 11 hastada subklinik hipotiroidi (%2), 23 hastada hipertiroidi (%3,9) ve 12 hastada subklinik hipertiroidi (%2,1) tespit edildi.

Sonuç: Atrial Fibrilasyon hem hipertiroidi ve hem hipotiroidi ile ilişkilidir. Tiroid fonksiyon bozuklukları AF'li hastalarda normal popülasyona göre daha sık görülür. AF'li hastalar tiroid bozuklukları açısından taranmalıdır.

Anahtar Kelimeler: Atrial Fibrilasyon, hipertiroidi, hipotiroidi

Sorumlu Yazar / Corresponding Author:
Perihan Varim,
Adnan Menderes Caddesi, Sağlık Sokak, No: 195-54000,
Adapazarı/Sakarya, Türkiye.
Tel: +90 264 255 21 06
E-mail: perihanvarim@hotmail.com

Yayın Bilgisi / Article Info:
Gönderi Tarihi/ Received: 24/03/2023
Kabul Tarihi/ Accepted: 17/06/2023
Online Yayın Tarihi/ Published: 06/09/2023

Atıf / Cited: Varim P and Demirci T. Evaluation of Thyroid Dysfunction in Patients with Atrial Fibrillation. *Online Türk Sağlık Bilimleri Dergisi* 2023;8(3):345-349. doi: 10.26453/otjhs.1270244

INTRODUCTION

Atrial fibrillation (AF) is a supraventricular arrhythmia characterized by disorganized, high-rate atrial electrical activity. Atrial fibrillation is the most common arrhythmia worldwide. The prevalence of AF is estimated at 4 per thousand in the general population and increases with age. In two separate studies, the prevalence was reported as 2-4% in the population over 60 years of age and 11.6% in those over 75 years of age. The incidence of AF is also age-related, increasing approximately twice for every ten years in adults. Incidence is given as 2-3 per thousand for the ages 55-64 per year, and 35 per thousand for the age range 85-94 years. AF is an independent risk factor for both cerebrovascular diseases and congestive heart failure.[1-3]

Thyroid hormones affect many systems, especially the cardiovascular system, and urogenital system in the body. The cardiovascular effects of thyroid hormones have been known for a long time. Hyperthyroidism is associated with AF. Subclinical hyperthyroidism is associated with a high resting heart rate, increased atrial and ventricular premature beat frequency, increased left ventricular mass index, and cardiac output. Previous studies on subclinical hyperthyroidism have suggested an increased risk of developing atrial fibrillation. However, overt hypothyroidism is associated with bradycardia, dyslipidemia, hypertension, atherosclerosis, decreased heart rate variability, and increased risk of myocardial infarction. It has been reported in the literature that neither subclinical nor overt hypothyroidism has been found to be a risk factor for AF.[4-6]

In this study, we aimed to reveal the frequency of thyroid dysfunction in newly diagnosed AF patients.

MATERIALS AND METHODS

Ethical Statement: Our study was approved by the xxx University Faculty of Medicine Non-Interventional Clinical Research Ethics Committee (Date: 14/10/2022, decision no: 310). The study was carried out by the Helsinki Declaration.

Subject and Study Design: Patients with atrial fibrillation over the age of 18, who were newly diagnosed with atrial fibrillation, and who applied to the cardiology outpatient clinic of our hospital between 01-01-2022 and 31-12-2022 were included in our study. The diagnosis of AF was made according to the ESC (European Society of Cardiology) 2020 Atrial Fibrillation guidelines.[3]

Irregular R-R intervals (in cases where atrioventricular conduction is not impaired), absence of prominent repetitive P waves and presence of irregular atrial activation in electrocardiography (ECG) were accepted as AF.

Demographic data, chronic disease history, TSH (Thyroid Stimulating Hormone), and fT_4 (free thyroxine) values of the patients were found using the hospital database.

Patients previously diagnosed with atrial fibrillation, osteoporosis, thyroid dysfunction (hypothyroidism, hyperthyroidism, taking a thyroid hormone, using thyroid medication), thyroid cancer, with a history of radiotherapy to the head and neck region, using amiodarone, digoxin, bisphosphonate, and vitamin K antagonists were excluded from the study.

Evaluation of Data: Subclinical hypothyroidism, hypothyroidism, euthyroidism, subclinical hyperthyroidism, and hyperthyroidism diagnoses of the patients were made based on the Turkish Endocrinology and Metabolism Association Thyroid Diseases Diagnosis and Treatment Guide 2020. Patients with TSH > 4.5 μU/L and fT_4 values within normal limits have subclinical hypothyroidism, patients with TSH > 4.5 μU/L and fT4 values below 22 pmol/L hypothyroidism, TSH (0.35 – 4.5 μU/L) and fT_4 (9-22 pmol) /L) patients with normal limits were considered euthyroid, patients with TSH < 0.35 μU/L and fT4 values were considered subclinical hyperthyroidism, and patients with TSH < 0.35 μU/L and fT4 values above 22 pmol/L were considered hyperthyroid.

Statistical Analysis: All statistical analyzes were performed using SPSS for Windows (SPSS 20, Inc.). When producing descriptive statistics, continuous variables were presented as mean ± standard or median, and nominal variables as several cases (n) and percentage (%).

RESULTS

A total of 587 patients were included in the study, 364 (62%) were female, and 223 (38%) were male. The mean age of the patients was 62.2 years. The youngest mean age with a mean age of 60.1 was found in the euthyroid patient group, and the most advanced mean age with a mean age of 70.8 was found in the subclinical hyperthyroidism group. According to the results of thyroid function tests, the patients were divided into five groups subclinical hypothyroidism, hypothyroidism, euthyroidism, subclinical hyperthyroidism, and hyperthyroidism. Euthyroid in 539 patients (91.7%), hypothyroidism in 2 patients (0.3%), subclinical hypothyroidism in 11 patients (2%), hyperthyroidism in 23 patients (3.9%), and subclinical hyperthyroidism in 12 patients (2.1%) (Table 1).

The patients were evaluated in terms of thyroid function tests. The mean thyroid stimulating hormone values were 1.86 ± 2.42 μU/L, and the mean free thyroxine values were 15.92 ± 6.28 pmol/L (Table 2).

Table 1. Demographic data.

	Hypothyroid	Subclinical Hypothyroid	Euthyroid	Subclinical Hyperthyroid	Hyperthyroid	Total
F/M (n)	7/4	1/1	335/204	8/4	13/10	587
Age Mean (year)	63.3 ± 8.3	64.8 ± 9.2	60.1 ± 9.5	70.8 ± 10.4	62.1 ± 7.8	62.2 ± 9.8

F/M: Female/Male.

Table 2. Thyroid Hormone values.

	Hypothyroid	Subclinical Hypothyroid	Euthyroid	Subclinical Hyperthyroid	Hyperthy-roid	Total
TSH (μU/L)	18,64 ± 15,86	7.22 ± 5,44	1.54±1.2	0.084	0.036 ± 0.022	1,86 ± 2.42
fT_4 (pmol/L)	1,94 ± 0.98	2.16 ± 1,42	15.2±3.67	16.86	22.26 ± 8.36	15.92 ± 6,28

The patients were also evaluated in terms of their chronic disease history. Backgrounds of Hypertension, Ischemic Heart Disease, Peripheral Vascular Disease, Cerebrovascular Disease, Chronic Obstructive Pulmonary Disease, Diabetes Mellitus, Congestive Heart Failure, and Chronic Kidney Failure were questioned. The three most common chronic diseases were found to be Hypertension (n:35), Diabetes Mellitus (n:22), and Ischemic Heart Disease (n:18) (Table 3).

Table 3. Additional diseases.

	Hypothyroid	Subclinical Hypothyroid	Euthyroid	Subclinical Hyperthyroid	Hyperthyroid	Total
HT (n)	2	1	21	5	6	35
IHD (n)	1	0	16	1	0	18
PVD (n)	0	0	1	0	0	1
CVD (n)	0	0	5	0	1	6
COPD (n)	0	0	3	0	0	3
DM (n)	2	1	15	3	1	22
CHF (n)	1	0	12	1	0	14
CRH (n)	0	0	1	0	0	1
Malignancy (n)	0	0	2	1	0	3

HT: Hypertension; IHD: Ischemic Heart Disease; PVD: Peripheral Vascular Disease; CVD: Cerebrovascular Disease: COPD; Chronic Obstructive Pulmonary Disease; DM: Diabetes Mellitus; CHF: Congestive Heart Failure; CRF: Chronic Renal Failure.

DISCUSSION AND CONCLUSION

When the literature is examined, we see that in most of the articles and reviews, cardiological pathologies in thyroid diseases are discussed. Our study investigated thyroid dysfunction in patients who applied to the cardiology outpatient clinic. This makes our study different and valuable from other studies.

The presence of autoimmune thyroid disease affects cardiac functions, even if thyroid hormones are in excess or low in venous blood and even thyroid hormone levels are within normal limits.

The prevalence of hypothyroidism over the age of 12 is 0.3% for overt hypothyroidism and 4.3% for subclinical hypothyroidism. The incidence of hypothyroidism is annual; It is given as 3.5 per 1000 for women and 0.6 for men. Hypothyroidism is seen 5-8 times more in women than in men.[7-9] When we examined the cardiovascular effects of subclinical hypothyroidism or overt thyroidism, it was associated with diastolic hypertension, sinus bradycardia, heart failure, tamponade, pericardial effusion, dyslipidemia, and atherosclerosis. There is no data revealing its relationship with AF.

In our study, we found hypothyroidism in 2 patients (0.3%) and subclinical hypothyroidism in 11 patients (2%). Our subclinical + clinical hypothyroidism rate was 2.3% in total. This rate was lower than expected in the normal population. 8 of the 13 patients were female, and five were male. The number of women was more than men. Our findings are consistent with the knowledge that hypothyroidism is not associated with AF and that hypothyroidism is more common in women.

Subclinical and hyperthyroidism are seen in 1.9-2.7% of women and 0.16-0.23 of men. The incidence in women is about ten times higher than in men. The incidence increases with age. The most common pathology caused by hyperthyroidism in the heart is tachyarrhythmias. Among the tachyarrhythmias, AF is the most common, and sinus tachycardia, which continues even at rest.[7-10]

In our study, hyperthyroidism was detected in 23

patients (3.9%) and subclinical hyperthyroidism in 12 patients (2.1%). Our subclinical + clinical hyperthyroidism rate was found to be 6% in total. This rate was higher than expected in the normal population. Again, of the 35 patients, twenty-one were female, and fourteen were male. The number of women was more than men. The fact that the rate of hyperthyroidism is higher in patients with AF compared to the normal population reveals a relationship between AF and hyperthyroidism.

Studies have shown that hyperthyroidism increases coronary blood flow by over 50%. The increase in oxygen consumption of the myocardium and the fact that the consumption of the atria is higher than that of the ventricles suggests that it prepares the ground for AF.[1] When the thyroid function tests of patients with atrial arrhythmia were examined in a study, 5% of the patients were found to have hyperthyroidism.[10] In another study, subclinical hyperthyroidism was found in 10% of patients with AF.[11] In a study, the incidence of AF in hyperthyroidism was found to be 12%, and it was shown that the frequency of AF was low in young hyperthyroid patients and increased significantly in the geriatric group.[12]

The most important limitation of our study is the number of cases. As another limitation, the relationship between AF and autoimmune thyroid diseases could be examined by looking at thyroid autoantibodies, but since our study was retrospective, these tests could not be examined because they could not be requested from the cardiology outpatient clinic. The other limitation of our study, free or total t_3 level was not included in the laboratory examinations, Therefore, it is impossible to evaluate especially T3 toxicosis in the subclinical hyperthyroidism group. The fact that the number of cases was not higher and examining the autoimmune disease relationship would have made our study more valuable.

In conclusion, thyroid dysfunction, especially hyperthyroidism, is more common in patients with AF compared to the normal population and plays a role in its pathophysiology. Therefore, patients with AF should be evaluated for thyroid dysfunction and thyroid function tests should be routinely requested.

Ethics Committee Approval: Our study was approved by the xx University Faculty of Medicine Non-Interventional Clinical Research Ethics Committee (Date: 14/10/2022, decision no: 310). The study was carried out by the Helsinki Declaration.

Conflict of Interest: No conflict of interest was declared by the authors.

Author Contributions: Concept – PV; Supervision; Materials – PV; Data Collection and/or Processing – TD; Analysis and Interpretation – PV; Writing – PV.

Peer-review: Externally peer-reviewed.

REFERENCES

1. Sagris M, Vardas EP, Theofilis P, et al. Atrial fibrillation: Pathogenesis, predisposing factors, and genetics. International Journal of Molecular Sciences. 2021;23(1):6. doi:10.3390/ijms23010006
2. Kornej J, Börschel CS, Benjamin EJ, et al. Epidemiology of atrial fibrillation in the 21st century: novel methods and new insights. Circulation Research. 2020;127(1):4-20. doi:10.1161/CIRCRESAHA.120.316340
3. Sepehri Shamloo A, Dagres N, Hindricks G, et al. 2020 ESC guidelines on atrial fibrillation: Summary of the most relevant recommendations and innovations. Each Z. 2021;46:28-37. doi:10.1007/s00059-020-05005-y
4. Kuś A, Teumer A, Medici M, et al. A deeper understanding of the causal relationships between thyroid function and atrial fibrillation. The Journal of Clinical Endocrinology & Metabolism. 2022;107(1):e429-e431. doi:10.1210/clinem/dgab525
5. Al-Makhamreh H, Al-Ani A, Alkhulaifat D, et al. Impact of thyroid disease in patients with atrial fibrillation: Analysis from the JoFib registry. Annals of Medicine and Surgery. 2022;74:103325. doi:10.1016/j.amsu.2022.103325
6. Huang M, Yang S, Ge G, et al. Effects of thyroid dysfunction and thyroid stimulating hormone levels on the Atrial fibrillation risks: a systematic review and dose-response meta-analysis from cohort studies. Endocrine Practice. 2022. doi:10.1016/j.eprac.2022.05.008
7. Thyroid Diseases Diagnosis and Treatment Guide 2020. Turkish Society of Endocrinology and Metabolism https://file.temd.org.tr/Uploads/publications/guides/documents/20200929134733-2020tbl_kilavuzf527c34496.pdf?a=1. Accessed January 08, 2023.
8. Cooper DS, Biondi B. Subclinical thyroid disease. The Lancet. 2012;379(9821): 1142-1154. doi:10.1016/S0140-6736(11)60276-6
9. Barbesino G. Thyroid function changes in the elderly and their relationship to cardiovascular health: a mini-review. Gerontology. 2019;65(1):1-8. doi:10.1159/000490911
10. Collet TH, Gussekloo J, Bauer DC, et al. Subclinical hyperthyroidism and the risk of coronary heart disease and mortality. Archives of Internal Medicine. 2012;172(10):799-809. doi:10.1001/archinternmed.2012.402
11. Bekiaridou A, Kartas A, Moysidis, DV, et al. The bidirectional relationship of thyroid disease and atrial fibrillation: Established knowledge and future considerations. Reviews in Endocrine and Metabolic Disorders. 2022;23(3):621-630.

doi:10.1007/s11154-022-09713-0
12. Kowalewski C. Mapping atrial fibrillation: An overview of potential mechanisms underlying atrial fibrillation. Each Z. 2021;46(4):305-311. doi:10.1161/CIRCRESAHA.120.316340