



## Original Article



## Frequency of Hyperthyroidism in Patients Diagnosed with Atrial Fibrillation

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## ARTICLE INFO

**Keywords:**

Tachyarrhythmias, Hyperthyroidism, Atrial Fibrillation, Thyroxin

**How to Cite:**Hussain, S., Nawaz, T., Hayat, F. S., Amin, M., & Shaharyar, U. (2025). Frequency of Hyperthyroidism in Patients Diagnosed with Atrial : Hyperthyroidism in Patients with Atrial Fibrillation. Pakistan Journal of Health Sciences, 6(7), 73-77. <https://doi.org/10.54393/pjhs.v6i7.2778>**\*Corresponding Author:**Tariq Nawaz  
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drtariqnz@gmail.comReceived Date: 16<sup>th</sup> January, 2025Revised Date: 3<sup>rd</sup> July, 2025Acceptance Date: 18<sup>th</sup> July, 2025Published Date: 31<sup>st</sup> July, 2025

## ABSTRACT

The global prevalence of hyperthyroidism in patients with atrial fibrillation (AF) ranges between 10% and 20%, with lower and higher rates in developed countries to regions with iodine deficiency and health care settings with limited resources, respectively. Demographic variations, such as age, the severity of hyperthyroidism, or differences in AF detection methods, may lead to additional disparities. Hence, the study was planned to help clarify these variations and facilitate more accurate global comparisons. **Objective:** To evaluate the prevalence of hyperthyroidism in patients diagnosed with AF. **Methods:** This cross-sectional study was conducted at Lady Reading Hospital, Peshawar, Department of Cardiology, from July 1, 2023, to December 31, 2023. 119 male and female participants in the age range of 30 to 60 years diagnosed with atrial fibrillation were enrolled. The patients were analyzed for hyperthyroidism. Serum TSH levels of blood test <0.1 mU/L and FT4 >1.5 ng/dL by laboratory were considered confirmatory for hyperthyroidism. **Results:** The Mean age of participants was 41.84 ± 8.376 years. Male participants were 79 (66.4%). Hyperthyroidism was found in 35 patients (29.4%). The p-value for the association between hyperthyroidism and hypertension was statistically significant (p-value=0.025). **Conclusions:** Our study revealed a higher frequency of hyperthyroidism-induced AF when compared to global reports. Iodine disorder, delayed diagnosis, multiple medical conditions, and economic inadequacies could be the underlying reasons. Female patients with atrial fibrillation, aged more than 45 years, with a history of hypertension, were more likely to have hyperthyroidism.

## INTRODUCTION

Atrial fibrillation is a disorder of cardiac electrical activity characterized by excessive excitatory activity of the atria leading to uncontrolled rapid transmission of electrical impulses to the ventricles [1]. It is a supraventricular tachyarrhythmic disorder and constitutes the most common type of cardiac rhythm disorder [2]. Irregular and dysrhythmic cardiac activity leads to turbulence in the blood flow, which is a prothrombotic condition, rendering the patients at risk of emergencies such as cerebrovascular accidents [3]. Clinical spectrum of atrial fibrillation is very wide, ranging from symptom-free to chest pain, syncope, palpitations and potentially fatal emergent conditions such as acute ischemic stroke [4]. Treatment strategies have evolved drastically over the years and include management of the underlying cause as well as the associated sequelae [5]. Anticoagulants are

offered to patients with AF to prevent prothrombotic events while simultaneously controlling the rate and rhythm of the heart. Depending upon the clinical settings, management to control rate and rhythm may be conservative to medical cardioversion or ablation techniques [6]. Hyperthyroidism is a syndrome arising from excessive production of thyroxin. Thyroxin is produced by the thyroid gland under the control of the pituitary gland. Thyroxin promotes metabolic activity of the body [7]. Cardiac effects of thyroxin include increased heart rate and contractility, leading to increased cardiac output [8, 9]. Pathologic hyper-stimulation of the thyroid by pituitary, ectopic production of thyroxin or any exogenous intake of thyroxin leads to hyperthyroidism [10]. More than half were found to have atrial fibrillation, followed by dilated cardiomyopathy and heart failure in a



study [11]. A study by Ullah *et al.*, has shown that the frequency of hyperthyroidism was 8.39% in patients with AF [12]. Hyperthyroidism-induced atrial fibrillation are seldom studied. International reports in this regard are variable which cannot be generalized.

Atrial fibrillation (AF) is one of the most common cardiac arrhythmias and is associated with significant morbidity and mortality. Thyroid dysfunction, particularly hyperthyroidism, is recognized as an important reversible cause of AF due to its stimulatory effects on cardiac rhythm and metabolism. However, the reported prevalence of hyperthyroidism among AF patients varies widely across different populations and healthcare settings. In Pakistan, limited local data are available regarding the burden of hyperthyroidism among patients diagnosed with AF, highlighting the need for further investigation to guide screening and management strategies. This study aims to provide valuable insights about the burden of thyroid derangements among patients with AF.

## METHODS

A descriptive cross-sectional study was performed at Lady Reading Hospital, Peshawar, Department of Cardiology. Participants were enrolled during the period from 1st July 2023 to 31st December 2023. Approval for the conduct of the study was obtained vide no: 765/LRH/MTI. Patients aged 30 to 60 years labelled with the diagnosis of atrial fibrillation were recruited. Patients with a history of cardiac valvular disorder, smoking, severe cardiopulmonary compromised patients, prior history of cardiac interventions, ischemic heart disease and patients taking rate-enhancing medications were excluded. The total sample size was 119, calculated using the WHO sample size calculator, taking the expected frequency of hyperthyroidism as 8.39%, 5% margin of error and a 95% confidence level [12]. Participants were enrolled using a non-probability consecutive sample technique. Atrial fibrillation was diagnosed on ECG, revealing a lack of obvious P waves with irregular R-R intervals. Hyperthyroidism was diagnosed by blood thyroid function tests, taking the simultaneous presence of 1) TSH <0.1 mU/L and FT4 >1.5 ng/dL as a cut-off for hyperthyroidism. The study risks, benefits and purpose were explained to the patients, and informed consent was obtained. Baseline clinical and demographic data were gathered. 10cc blood samples were obtained from all participants and sent to the hospital laboratory for estimation of thyroid-stimulating hormone level and free thyroxin. All samples were processed and placed in a hormone analyzer for estimation of TSH and free T4 to record the presence or absence of hyperthyroidism. Data were analyzed using SPSS version 26.0. Categorical data were presented as frequencies and percentages, and continuous data as mean  $\pm$  SD. Effect

modifiers were controlled through stratification. Test of statistical significance included a chi-square test, applied at 5% level of significance.

## RESULTS

The mean age of the participants was  $41.84 \pm 8.376$  years, the mean weight was  $75.14 \pm 5.874$  kg, the mean height was  $172.89 \pm 6.493$  cm, mean BMI was  $25.204 \pm 2.2996$  kg/m<sup>2</sup> (Table 1).

**Table 1:** Patients According to Age, Weight, Height and BMI (n=119)

Demographics and Baseline Characteristics	Mean $\pm$ SD
Age (years)	41.84 $\pm$ 8.376
Weight (kg)	75.14 $\pm$ 5.874
Height (cm)	172.89 $\pm$ 6.493
BMI (kg/m <sup>2</sup> )	24.29 $\pm$ 2.647

The majority of the participants were male (n=79, 66.4%), while the age group  $\leq 45$  years was most common (n=93, 78.2%). For comorbidities, diabetes was recorded in 40 patients (33.6%), and hypertension was observed in 31 (26.1%) patients. 71 patients (59.6%) belonged to rural areas, and 83 patients (69.7%) had a BMI within the healthy range (18.5-24.9 kg/m<sup>2</sup>) (Table 2).

**Table 2:** Frequency and Percentages of Patients According to Various Clinic-Demographic Parameters (n=119)

Parameters	Subgroups	n (%)
Gender	Male	79 (66.4%)
	Female	40 (33.6%)
Age	$\leq 45$ Years	93 (78.2%)
	>45 Years	26 (21.8%)
Diabetes	Yes	40 (33.6%)
	No	79 (66.4%)
Hypertension	Yes	31 (26.1%)
	No	88 (73.9%)
Residence	Rural	71 (59.6%)
	Urban	48 (40.4%)
BMI (kg/m <sup>2</sup> )	18.5-24.9	83 (69.7%)
	25.0-29.9	26 (21.8%)
	30.0 and Above	10 (8.4%)

It was recorded in 35 participants (29.4). 19 patients (15.9%) had overt hyperthyroidism and 16 (13.4%) had subclinical hyperthyroidism. AF was most frequently diagnosed incidentally (n = 53, 44.5%), and chest pain was the most frequent symptom (n=31, 26.0%) (Table 3).

**Table 3:** Frequency and Percentages of Patients According to Outcome Variable (n=119)

Outcome Variables	Subgroups	n (%)
Hyperthyroidism	Yes	35 (29.4%)
	No	84 (70.6%)
Presenting Complaints	Syncope	07 (5.8%)
	Chest Pain	31 (26.0%)
	Incidental AF	53 (44.5%)
	AF Related Complications	15 (12.6%)

	Overt Hyperthyroidism	19(15.9%)
	Subclinical Hyperthyroidism	16(13.4%)

Hyperthyroidism was more frequent in female (n=14, 35.0%) compared to male (n=21, 26.6%). P-value=0.341. Hyperthyroidism was recorded in 10 (38.5%) patients aged more than 45 years compared to 25 (26.9%) patients aged less than 45 years (p-value 0.252). The p-value for the distribution of hyperthyroidism for diabetes and hypertension was 0.109 and 0.025, respectively (Table 4).

**Table 4:** Subgroup Analysis of Hyperthyroidism with Various Parameters (n=119)

Variables		Hyperthyroidism		Total	Chi-square (p-Value)
		Yes (n=35)	No (n=84)		
Gender	Male	21(26.6%)	58(73.4%)	79(100.0%)	0.341
	Female	14(35.0%)	26(65.0%)	40(100.0%)	
Age (Years)	≤45	25(26.9%)	68(73.1%)	93(100.0%)	0.252
	>45	10(38.5%)	16(61.5%)	26(100.0%)	
Diabetes Mellitus	Yes	8(20.0%)	32(80.0%)	40(100.0%)	0.109
	No	27(34.2%)	52(65.8%)	79(100.0%)	
Hypertension	Yes	14(45.2%)	17(54.8%)	31(100.0%)	0.025
	No	21(23.9%)	67(76.1%)	88(100.0%)	

## DISCUSSION

The cardiovascular milieu is maintained under tight hormonal control. Thyroxin plays an essential role in regulating this homeostasis. Intrinsic production or extrinsic intake of thyroxin leads to a clinical syndrome affecting various organs, including the heart. Bakarmom *et al.*, reported 3.6% prevalence of hyperthyroidism among patients with AF [13]. Increased heart rate is a common manifestation of hyperthyroidism [14]. In this study, the frequency of hyperthyroidism in patients with AF was 35(29.4%). Distribution of hyperthyroidism with various clinical and demographic parameters showed that hyperthyroidism was more frequently recorded in patients aged less than 45 years, 25 (26.9%) of patients, as compared to 10(38.5%) patients in the age group more than 45 years. The p-value for the difference in distribution of hyperthyroidism for age was 0.341 (>0.050), hence statistically insignificant. Overall frequency of hyperthyroidism among patients with AF in a study by Ullah S and colleagues was 13(8.39%) patients, which was much lower compared to our study [14]. Atrial fibrillation was reported in a higher proportion in a study (about 21%) in patients with Graves' disease. Similar to patients with Graves' disease and similar to our observation, age-wise distribution showed higher prevalence among patients aged more than 40 years (31% versus 0%) [15]. This inconsistency in the results may be attributed to variations in population factors, such as regional differences in thyroid disease, iodine intake, or genetic susceptibility. While other studies may have relied on clinical suspicion or symptomatic presentation, our study actively screened all

AF patients for thyroid dysfunction; as a result, younger patients with subclinical hyperthyroidism may have been underdiagnosed in those studies. Male participants were more in our study. The number of male participants in our study was 79 (66.4%) as compared to 40 (33.6%) female participants. This finding aligns with the results of a study by Ullah *et al.*, where the distribution of hyperthyroidism in male patients was 26.6% as compared to 35.0% in female patients [12]. We could not report a statistically significant difference in the distribution of hyperthyroidism across different genders. Male participants were more likely to have hyperthyroidism compared to female (60.6% versus 39.3%) in a study by Ullah and colleagues [14]. New onset AF was reported in 1% patients with hyperthyroidism in a review study. It was concluded to rule out hyperthyroidism among all patients with findings consistent with AF on ECG, with previously unremarkable findings. Moreover, screening should be performed irrespective of the presence or absence of clinical signs and symptoms of hyperthyroidism [16]. A slightly higher proportion (13%) was reported in another study [17]. Wang CL and coworkers reported that the prevalence of AF is proportional to the level of biochemical derangements in thyroid profile, with an increased likelihood of AF in patients having higher thyroxin levels [18]. However, the lack of a control group for comparison limits the claim. In a study by Chanyavanich discovered that 8.3% of patients experienced AF or flutter within 30 days of diagnosis [19]. In a comparative study by Huang *et al.*, 13.8% with clinically overt hyperthyroidism, 13.8% developed AF compared to 2.3% in the control group (individuals with normal thyroid profile) [20]. For comorbidities, the rate of hyperthyroidism was insignificantly associated between diabetics and non-diabetics. However, the p-value for association between the presence of hyperthyroidism and hypertension was 0.025 (<0.050), i.e. statistically significant. Hypertension might be a manifestation of hyperthyroidism in these patients. Similar findings were reported in other studies with respect to diabetes and hypertension. Moreover, reports about the association between smoking history and hyperthyroidism were variable [21]. Patients with a smoking history were excluded to control bias; hence, no conclusion can be drawn in this regard from this research. Given that a smaller cohort might not adequately capture population-level trends or uncommon connections, the sample size in this study may have an impact on the reported prevalence of hyperthyroidism. A larger sample size would increase statistical power, decrease variability, and maybe produce more accurate estimates. Future research should examine potential age-associated variables, such as the effects of ageing-related cardiac remodeling, or cumulative cardiovascular risk factors (e.g., diastolic dysfunction, hypertension), that may influence

the link between hyperthyroidism and AF. Examining age-related factors might help lower the incidence of AF and yield therapeutically useful information.

This study has certain limitations, including a relatively small sample size and its single-center design, which may limit the generalizability of the findings to the broader population. Additionally, the cross-sectional nature of the study restricts the ability to establish causal relationships between hyperthyroidism and atrial fibrillation. Variations in iodine intake, lifestyle factors, and other comorbid conditions were not extensively explored. Future multicenter studies with larger sample sizes and longitudinal follow-up are recommended to better understand the temporal relationship between thyroid dysfunction and AF and to evaluate the benefits of routine thyroid screening in AF patients.

## CONCLUSIONS

Hyperthyroidism is frequently seen in patients diagnosed with atrial fibrillation. Female patients are likely to have hyperthyroidism compared to males. The proportion of hyperthyroidism was higher in patients aged more than 45 years. A statistically insignificant difference was recorded in the distribution of hyperthyroidism among diabetics and non-diabetics. However, the association between hyperthyroidism and the presence of hypertension was statistically significant.

## Authors' Contribution

Conceptualization: SH, FSH

Methodology: SH, FSH, MA

Formal analysis: SH

Writing and Drafting: TN, US

Review and Editing: TN, US, SH, FSH, MA

All authors approved the final manuscript and take responsibility for the integrity of the work

## Conflicts of Interest

All the authors declare no conflict of interest.

## Source of Funding

The author received no financial support for the research, authorship and/or publication of this article.

## REFERENCES

- [1] Lehto M, Haukka J, Aro A, Halminen O, Putaala J, Linna M et al. Comprehensive Nationwide Incidence and Prevalence Trends of Atrial Fibrillation in Finland. *Open Heart*. 2022 Nov; 9(2): e002140. doi: 10.1136/openhrt-2022-002140.
- [2] Zubair Khan M, Gupta A, Hodge J, Patel K, Patel K, Zarak MS et al. Clinical Outcomes of Atrial Fibrillation with Hyperthyroidism. *Journal of Arrhythmia*. 2021 Aug; 37(4): 942-8. doi: 10.1002/joa3.12550.
- [3] Kostopoulos G and Effraimidis G. Epidemiology, Prognosis, and Challenges in the Management of Hyperthyroidism-Related Atrial Fibrillation. *European Thyroid Journal*. 2024 Apr; 13(2). doi: 10.1530/ETJ-23-0254.
- [4] Huang M, Yang S, Ge G, Zhi H, Wang L. Effects of Thyroid Dysfunction and the Thyroid-Stimulating Hormone Levels on the Risk of Atrial Fibrillation: A Systematic Review and Dose-Response Meta-Analysis from Cohort Studies. *Endocrine Practice*. 2022 Aug; 28(8): 822-31. doi: 10.1016/j.eprac.2022.05.008.
- [5] Tefera EM, Tefera YM, Yimer M, Mulat Worku B, Ayele E, Zewdu Asmare B et al. Atrial Fibrillation and Associated Factors Among Hyperthyroidism Patients Attending at University of Gondar Comprehensive Specialized Hospital, Northwest Ethiopia. *Clinical Medicine Insights: Endocrinology and Diabetes*. 2024 Sep; 17: 11795514241285347. doi: 10.1177/11795514241285347.
- [6] Inoue K, Guo R, Lee ML, Ebrahimi R, Neverova NV, Currier JW et al. Iodine-Induced Hyperthyroidism and Long-Term Risks of Incident Atrial Fibrillation and Flutter. *The Journal of Clinical Endocrinology and Metabolism*. 2023 Oct; 108(10): e956-62. doi: 10.1210/clinem/dgad250.
- [7] Hytting J, Celik S, Bodeström Eriksson L, Mallios P, Digerfeldt C, Waldemar A et al. Prevalence of Abnormal Thyroid Hormone Levels in Acute New-Onset Atrial Fibrillation. *Frontiers in Cardiovascular Medicine*. 2025 Jan; 11: 1518297. doi: 10.3389/fcvm.2024.1518297.
- [8] Taylor PN, Albrecht D, Scholz A, Gutierrez-Buey G, Lazarus JH, Dayan CM et al. Global Epidemiology of Hyperthyroidism and Hypothyroidism. *Nature Reviews Endocrinology*. 2018 May; 14(5):301-16. doi: 10.1038/nrendo.2018.18.
- [9] Varim P and Demirci T. Evaluation of Thyroid Dysfunction in Patients with Atrial Fibrillation. *Online Turkish Journal of Health Sciences*. 2023 Jul; 8(3): 345-9. doi: 10.26453/otjhs.1270244.
- [10] Ahmad M, Reddy S, Barkhane Z, Elmadi J, Kumar LS, Pugalenthi LS. Hyperthyroidism and the Risk of Cardiac Arrhythmias: A Narrative Review. *Cureus*. 2022 Apr; 14(4). doi: 10.7759/cureus.24378.
- [11] Gencer B, Cappola AR, Rodondi N, Collet TH. Challenges in the Management of Atrial Fibrillation with Subclinical Hyperthyroidism. *Frontiers in Endocrinology*. 2022 Jan; 12: 795492. doi: 10.3389/fendo.2021.795492.
- [12] Ullah I, Shakir Ghaffar MI, Zeb F, Tahir S, Zaman MH. Prevalence of Hyperthyroidism in Patients with Atrial Fibrillation. *The Pakistan Journal of Medical and*

- Health Sciences. 2022 Oct; 16(10): 869-871. doi: 10.53350/pjmhs221610869.
- [13] Bakarmom MK, ALmuhanha AN, Alhussaini SA, Alghamdi A, Suliman I, Bakarmom M et al. The Prevalence of Hyperthyroidism Amongst Atrial Fibrillation Patients in the National Guard Hospital, Riyadh, Saudi Arabia: A Cross-Sectional Retrospective Study. *Cureus*. 2023 Oct; 15(10). doi: 10.7759/cureus.46791.
- [14] Ullah S, Ahmad A, Akhtar S, Shah SS, Ashraf A. Frequency of Hyperthyroidism in Patients Presenting with Atrial Fibrillation to Cardiology Unit Khyber Teaching Hospital Peshawar. *Pakistan Heart Journal*. 2022 Nov; 55(Supplement1): S9-. doi: 10.47144/phj.v55iSupplement1.2425.
- [15] Cho YY, Kim B, Choi D, Kim CH, Shin DW, Kim JS et al. Graves' Disease, Its Treatments, and the Risk of Atrial Fibrillation: A Korean Population-Based Study. *Frontiers in Endocrinology*. 2022 Nov; 13: 1032764. doi: 10.3389/fendo.2022.1032764.
- [16] Reddy V, Taha W, Kundumadam S, Khan M. Atrial Fibrillation and Hyperthyroidism: A Literature Review. *Indian Heart Journal*. 2017 Jul; 69(4): 545-50. doi: 10.1016/j.ihj.2017.07.004.
- [17] Jay M, Huan P, Cliffe N, Rakoff J, Morris E, Kavsak P et al. Treatment of Subclinical Hyperthyroidism and Incident Atrial Fibrillation. *Clinical Endocrinology*. 2025 Mar; 102(3): 315-23. doi: 10.1111/cen.15150.
- [18] Wong CL, Tam HK, Fok CK, Lam PK, Fung LM. Thyrotoxic Atrial Fibrillation: Factors Associated with Persistence and Risk of Ischemic Stroke. *Journal of Thyroid Research*. 2017; 2017(1): 4259183. doi: 10.1155/2017/4259183.
- [19] Chanyavanich P and Polamaung W. Incidence of Hyperthyroidism Among in-Patients with Atrial Fibrillation. *Chulalongkorn Medical Journal*. 2013; 57(5). doi: 10.58837/CHULA.CMJ.57.5.4.
- [20] Huang PS, Cheng JF, Chen JJ, Wang YC, Hwang JJ, Wu CK et al. Higher Risk of Incident Hyperthyroidism in Patients with Atrial Fibrillation. *The Journal of Clinical Endocrinology and Metabolism*. 2024 Jan; 109(1): 92-9. doi: 10.1210/clinem/dgad448.
- [21] Arshad A, Ather CA, Sulehria SB, Choudhary S, Rehman M, Mehmood Z. Frequency of Hyperthyroidism in patients of Atrial Fibrillation. *Pakistan Journal of Medical and Health Sciences*. 2023 Feb; 17(01): 73-. doi: 10.53350/pjmhs202317173.