

ORIGINAL ARTICLE

Frequency of Hyperthyroidism in patients of Atrial Fibrillation

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ABSTRACT

Aim: To find the frequency of hyperthyroidism in patients of atrial fibrillation admitted in Mayo hospital Lahore.**Study setting:** The study was conducted at Emergency Department, Cardiology Department and Department of Internal Medicine in Mayo Hospital Lahore**Duration of study:** It was from May 20, 2019 to November 20, 2019.**Study design:** It was Cross-Sectional study**Methods:** patients suffering with atrial fibrillation fulfilling the operational definition and inclusion criteria were enrolled. After aseptic measures, blood sample of 5 ml was drawn from left cubital vein with low sucking pressure. Sample was deposited to Center for Nuclear Medicine (CENUM) Laboratory at Mayo Hospital Lahore for thyroid function tests. Serum Thyroid Stimulating Hormone, Thyroxine and Triiodothyronine levels were noted and hyperthyroidism labeled as per the operational definition. Data was collected by the researcher himself noted on a specially designed proforma and presented in the form of tables and diagrams.**Results:** The mean value of age in our study was 55.13±14.01 year. In our study 40(42.6%) patients had hyperthyroidism.**Conclusion:** High frequency of hyperthyroidism in our study, suggests that routine thyroid function tests using sensitive thyroid-stimulating hormone assay with free T4 & free T3 levels is required in all those with acute atrial fibrillation.**Keywords:** Hyperthyroidism, Atrial Fibrillation.

INTRODUCTION

Atrial fibrillation is most frequently encountered cardiac arrhythmia all over world¹. It is characterized by uncoordinated activity of atrium with deterioration of mechanical function of heart². Common cardiovascular risk factors like raised blood pressure, diabetes mellitus, obesity, obstructive sleep apnea syndrome, physical inactivity and use of alcohol leading on to coronary artery disease & heart failure significantly contribute to development of atrial fibrillation³. It carries a 5-fold increased risk of thromboembolic complications like stroke as well as development of heart failure, with 10%-40% of such hospitalized annually⁴. Atrial fibrillation is a major public health issue across the globe, being reported by numerous studies as a growing evidence⁵. In 2010, estimated number of individuals with atrial fibrillation were 33.5 million (20.9 million were men and 12.6 million were women) globally⁶ and incidence was notably greater in developing countries. In Pakistan, irrespective of age group, approximately 6.5% of patients presenting to health care department suffer from atrial fibrillation⁷.

In a study carried out by Durrani at Jinnah Post Graduate Medical Centre Karachi, it was concluded that out of 458 stroke patients, 190(41.48%) had atrial fibrillation². There is substantial evidence from previous studies that there is high prevalence of hyperthyroidism in atrial fibrillation patients. In a cohort study in Denmark by Selmer et al, they found a significantly higher risk of hyperthyroidism associated with new-onset atrial fibrillation(3%) compared to individuals in the general population(1%)⁸.

Similarly, study carried out by Barbisan et al. also revealed high prevalence (6.5%) of hyperthyroidism in patients of atrial fibrillation⁹. Although there is some evidence about prevalence of hyperthyroidism in patients with atrial fibrillation, but definite verdict is still conflicting, especially so in developing countries. Moreover, no study from Pakistan has clearly been described the frequency of hyperthyroidism in patients with atrial fibrillation.

Therefore, rationale of our study is to determine the frequency of hyperthyroidism in atrial fibrillation patients at a tertiary care hospital in our country. It will add to the existing body of knowledge. Moreover, its results will be useful for the

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practitioners owing to locally produced evidence. Atrial fibrillation patients were diagnosed as having atrial fibrillation on the basis of electrocardiogram showing irregularly irregular rhythm and absent P waves. Hyperthyroidism patients were diagnosed with hyperthyroidism based on thyroid function tests i.e. serum Thyroid Stimulating Hormone (TSH) levels <0.3mIU/L; Thyroxine (free T4) >23.0pmol/L and Triiodothyronine (free T3) >5.8pmol/L.

MATERIALS AND METHODS

The study was conducted at Emergency, Cardiology and Internal Medicine Departments of Mayo Hospital Lahore. Study was performed from May 20, 2019 to November 20, 2019. It was a Cross-Sectional Study Sample size of 94 patients was calculated using WHO software in health studies. Formula for estimating a proportion with specified absolute precision is used with following assumptions: Confidence level=95% Anticipated population proportion i.e. prevalence of hyperthyroidism in atrial fibrillation patients=41.48%² Absolute precision=5% with non-probability consecutive sampling technique was used. Patients aged 18 to 80 years of either gender & diagnosed as atrial fibrillation as per operational definition were **included** while patients having valvular heart disease on trans-thoracic echocardiography, having chronic obstructive pulmonary disease, determined on history and Chest X-ray (PA view), using drugs affecting Thyroid profile, having history of thyroidectomy, radioactive iodine ablation of thyroid or antithyroid drugs & having history of head trauma or head surgery were excluded.

Data collection procedure: Formal approval was granted by Institutional Review Board (IRB) in King Edward Medical University/Mayo hospital Lahore, and all possible ethical concerns were fully discussed with the supervisor and other senior faculty members. All the patients presenting in the Departments of Emergency, Cardiology and Internal Medicine, fulfilling the operational definition and inclusion criteria were enrolled in the research after obtaining a formal written and informed consent. Confounders were controlled by meticulously following the inclusion and exclusion criteria. Prior to taking consent, patients were assured that their confidentiality and privacy was not be

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breached at all. After aseptic measures, blood sample of 5 ml was drawn from left cubital vein with low sucking pressure. Sample was deposited to Center for Nuclear Medicine (CENUM) laboratory at Mayo Hospital Lahore for thyroid function tests¹⁰. Serum Thyroid Stimulating Hormone, Thyroxine and Triiodothyronine levels were noted and hyperthyroidism labeled as per the operational definition. Data were collected by the researcher himself noted on a specially designed proforma and presented in the form of tables and diagrams. Data were analyzed with SPSS v26.0. Categorical variables like gender and presence or absence of hyperthyroidism were presented as frequencies and percentages. Data outcome variable was stratified by age, gender and BMI. Chi-square test was used with 5% level of significance.

RESULTS

In our study, frequency distribution of gender showed 50(53.2%) male and 44(46.8%) females. The mean value of age was 55.13±14.01 year. In our study, 18(19.1%) patients were in 18-40 years age group, 40(42.6%) patients in 41-60 years age group and 36(38.3%) patients were in >61 years age group. The mean BMI was 26.20±2.95kg/m². In BMI results, 47(50%) had normal BMI, 32(34%) were overweight and 15(16%) were obese. Mean value of TSH was 0.79±0.62mIU/L. Mean value of free T₃ was 4.91±1.24pmol/L¹¹. Mean value of free T₄ was 19.94±4.26pmol/L. In our study, 40(42.6%) patients had hyperthyroidism. Stratification results of hyperthyroidism with gender and BMI showed non-significant results and with age groups significant results.

DISCUSSION

Sawin et al told a 2.8 times increase in atrial fibrillation in subclinical hyperthyroidism subjects who were more than 60 years¹². Later on majority studies were of similar opinion^{13,14}. Rotterdam study by Heeringa et al observed a graded risk with atrial fibrillation & higher thyroxine levels & lower value of serum thyroid stimulating hormone¹⁵.

Mechanism was actually hypothesized by Heeringa et al and is believed to be threefold chance of atrial fibrillation. Active tri-iodothyronine in serum binds to T₃ nuclear receptors which results in specific cardiac gene expression leading to heart rate reduction by reducing vagal tone to an extent which may result in increased risk for cardiac arrhythmias. Tri-iodothyronine results in peripheral vasodilation, increasing preload and altering contraction of heart which may lead to atrial fibrillation. Serum TSH has also been an independent marker of atrial fibrillation with increased risk of atrial fibrillation regardless of free thyroxine levels in those more than age 60 years of age. While no guidelines are available regarding frequency of monitoring thyroid function tests, association noted need prompt close monitoring of thyroid function tests in elderly as per clinicians discretion. In our study 40(42.6%) patients had hyperthyroidism. These results match with this study². Without doubt hyperthyroidism is also a very well known contributory factor in atrial fibrillation. In another large study by Frost et al, all patients with recent hyperthyroidism in inpatient department were followed up for a month after diagnosis to check for a new onset atrial fibrillation or flutter. It was observed that 8.3% out of those patients had a new onset atrial fibrillation or flutter¹⁶.

In patients of hyperthyroidism it was observed that those who were male, having advancing age, having coronary artery disease, having biventricular cardiac failure and valvular heart lesions were seen to have a very high frequency of atrial fibrillation. There was substantial evidence from previous studies that there was high prevalence of hyperthyroidism with atrial fibrillation. In a large cohort study in Denmark by Selmer et al, 145,623 patients with new onset atrial fibrillation were followed in outpatient department for thirteen long years to see if they would have been developed hyperthyroidism. They found a significantly higher risk of hyperthyroidism associated with new-onset atrial fibrillation which was 3% compared to individuals in general

population which was about 1%⁸. Similarly, a study carried out by Barbisan et al also revealed very high prevalence of hyperthyroidism in atrial fibrillation patients which was approximately 6.5%⁹.

CONCLUSION

High prevalence of hyperthyroidism in our study indicates that routine thyroid function tests using very sensitive thyroid-stimulating hormone (TSH) assay as well as free T₄ & free T₃ is recommended in all those with recent acute atrial fibrillation.

Recommendations: It is strongly recommended that all patients of atrial fibrillation must be checked for Thyroid function tests.

Conflict of interest: There was no conflict of interest to anyone.

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