A Survey on Thyrotoxicosis Frequency in Patients with Heart Failure Hospitalized in Ekbatan Cardiac Hospital of Hamadan City

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Abstract

Objective:
The aim of this study was to determine thyrotoxicosis frequency in patients with heart failure hospitalized in Ekbatan Cardiac Hospital, Hamadan.

Material &Methods:
In this cross-sectional, descriptive study, patients with heart failure hospitalized in a cardiac hospital were characterized on the basis of physical examination (the Framingham criteria) and evaluation of hospital records. The patients were thereafter assessed for the presence of thyroid dysfunction. For all the patients, T3, T4, and TSH tests were done via the ELISA method. For every patient, a questionnaire was completed, including the results of the tests and also data on age, sex, duration of cardiac disease, and medical history.

Results:
From 200 patients in this study, 90 (45%) patients were male and 110 (55%) were female. From these patients, 3 (1.5%) had thyrotoxicosis, 2 (1%) had hypothyroidism, 13 (6.5%) had sub-clinical hyperthyroidism, 12 (60%) had sub-clinical hypothyroidism, and 170 (85%) had no thyroid dysfunction. The mean time of heart failure (history of cardiac disease) in the patients with thyrotoxicosis was 4 ± 1 years and in the other patients (without thyrotoxicosis) was 5.43 ± 2.4 years. The mean age in the patients with thyrotoxicosis was 73.33 ± 5.77 years and in the other patients was 63.98 ± 11.86 years. Five patients with heart failure used Amiodarone and none of them had thyroid dysfunction.

Conclusion:
This evaluation showed that the frequency of thyrotoxicosis in our patients with heart failure was of low prevalence. Also, the frequency of thyrotoxicosis was not associated with sex, age, and duration of cardiac disease. . ***(Iranian Heart Journal 2012; 13(3):22-26).***

Keywords: Heart diseases■ Heart failure■Thyroid diseases■ Thyrotoxicosis

Introduction

Thyrotoxicosis is a condition in which an excessive amount of thyroid hormones causes a range of adverse clinical effects, affecting different organ systems. Thyrotoxicosis affects the heart, in a both direct and indirect manner, and the most prevalent clinical manifestation is sinus tachycardia. Other manifestations include arrhythmia (most prevalent atrial fibrillation [AF]), chest angina, and heart failure (HF). HF due to thyrotoxicosis mostly happens in patients with a history of heart conditions, heart failure might occur in people with no prior underlying

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heart condition. In recent years, there have been some studies which claim that thyrotoxicosis is one of the main causes of decompensated HF mostly in the elderly [1-3]. The effects of thyroid hormones on the heart have been studied and described since the discovery of the phenomenon about 200 years ago.

V. Parry was the first to notice the relation between the abnormal size of the thyroid gland and heart failure. He observed the increase in the heart rate and palpitation in 8 patients with goiter, four of whom had had cardiomegaly.

Fifty years later, R. Graves described long lasting and severe palpitation in 4 women with thyrotoxicosis. A study in the United States demonstrated several cases of thyrotoxicosis and related HF.

In a case report in Canada, a 41-year-old man presenting with severe and symptomatic chronic HF was later diagnosed with dilated cardiomyopathy due to thyrotoxicosis.

Despite his primary left ventricular ejection fraction of 20% and presence of global hypokinesia on his first echocardiography, treatment with anti-thyroid drugs results in rapid improvement of clinical condition and ejection fraction.

In a study in 1991 in Romania, 403 patients with thyrotoxicosis were evaluated. Eighty-seven of the study population had cardiac manifestations, and congestive HF happened in 10.42%. Most prevalent arrhythmias included AF (4%), ventricular premature beats (2.77%), supraventricular tachycardia (2.23%), and atrial flutter (1%).

Moreover, in 90% of the cases, the arrhythmias changed to sinus rhythm after proper treatment.

Since it is possible that thyrotoxicosis remains undiagnosed in a patient with HF (e.g. cardiomyopathy) and since timely diagnosis and rapid treatment of HF in such patients can prevent incurable diseases, we decided to conduct the present study to investigate the frequency of thyrotoxicosis in HF patients.

Methods

In this cross-sectional, descriptive study, a sample size of 200 patients was determined using a statistical formula. Patients hospitalized due to HF in Ekbatan Cardiac Hospital of Hamadan were evaluated by physical examination (according to the Framingham criteria) and hospital files.

After making necessary arrangements with the hospital's laboratory, the patients were briefed about the study in order to obtain informed consent. Levels of T3, T4, and TSH were then evaluated via the ELISA method.

The laboratory results, demographic data, duration of cardiac disease, and medical history of the patients were filed in a questionnaire and the data were analyzed with SPSS Statistical software package, using the *t*-test and $\chi^{2.}$

Patients hospitalized in the cardiology ward without HF and patients refusing laboratory test because of extra costs were excluded from the study.

Results

The study population included 3 patients with thyrotoxicosis, 2 patients with hypothyroidism, 13 patients with sub-clinical hyperthyroidism, and 12 patients with sub-clinical hypothyroidisms. Additionally, 170 patients had no thyroid disorder (Figure 1).

The mean age of the patients with thyrotoxicosis was 73.33 ± 5.77 years and the mean age of the other patients was 63.98 ± 11.86 years (p value =0/175).

The mean duration of HF (cardiac disease history) was 4 ± 1 years and 5.43 ± 2.4 years in the thyrotoxicosis patients and the others, respectively (p value =0/306). From the 200 cases recruited in this study, 5 patients with HF used Amiodarone, and none of them had thyroid dysfunction.

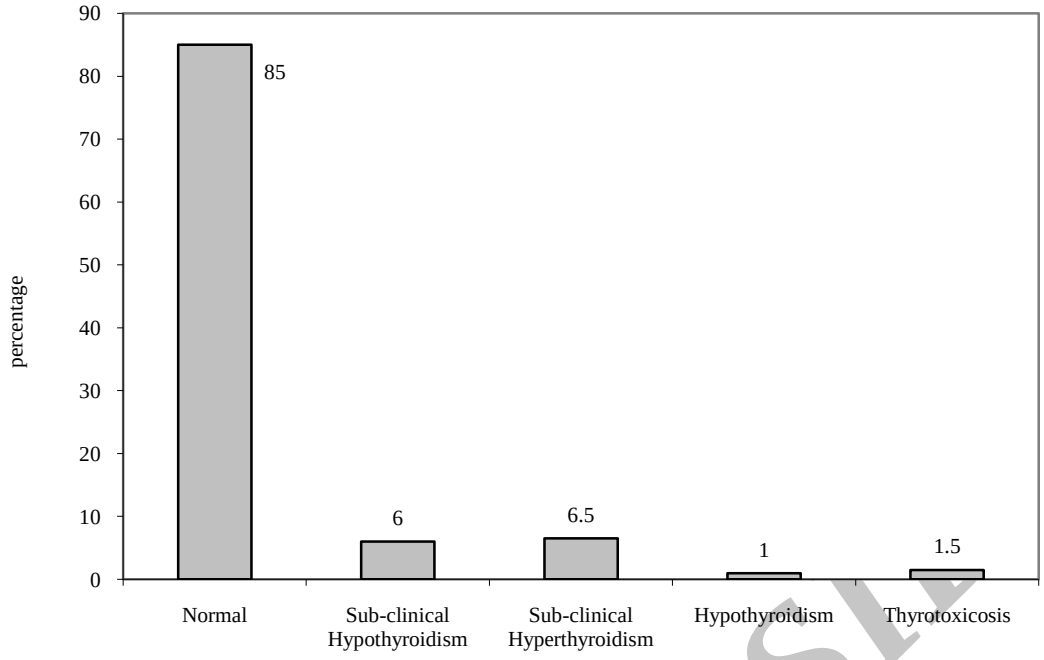

Table 1 demonstrates that all the 3 patients with thyrotoxicosis were female.

P value*	Total Number(Percentage)	Female Number(Percentage)	Male Number(Percentage)	Thyrotoxicosis
0/164	3(1.5)	3 (2.7)	-	Does have
	197 (98.5)	107 (97.3)	90 (100)	Does not have
	200 (100)	110 (100)	90 (100)	Total

Conclusion

This study was performed to determine the frequency of thyrotoxicosis and other thyroid dysfunctions in HF patients. Considering the results, the prevalence of thyrotoxicosis in our HF patients was low.

Several different studies in recent years have shown that thyrotoxicosis is one of the rare but important causes of decompensated HF, especially in the elderly. Most of these studies were case reports and case series and they are about hospitalized cases of dilated cardiomyopathy without any known cause in the cardiology ward. Further investigations demonstrated that the patients had thyrotoxicosis and with proper treatment of this condition, clinical manifestations of HF and left ventricular ejection fraction (according to serial echocardiography) were improved [2,3, 5-9]. Few studies have determined the frequency of thyrotoxicosis in decompensated HF patients. A study in an urban hospital in the USA (with the majority of the patients being African Americans), from 101 admitted patients due to decompensated HF, 1% had thyrotoxicosis (10). Comparison between the frequency of thyrotoxicosis in that study and ours shows the significance and accuracy of our study.

The results of the present study demonstrated that thyrotoxicosis in our HF patients was not associated with sex. In other words, the frequency was not different between our male and female subjects. The results also showed that the mean age of the patient with thyrotoxicosis did not differ with that of the patients without thyrotoxicosis.

In a study conducted in the USA, all 535 cardiac patients of an urban hospital were

evaluated for AF, cardiomyopathy, and congestive heart failure during a period of 14 months. Among 171 AF patients, 21 patients had thyrotoxicosis and 11 patients had both AF and thyrotoxicosis. Among these 11 people, 5 had congestive HF (without any evidence of other organic heart condition) and 6 had AF without clinical manifestations. Five CHF patients were significantly younger than patients with double diagnosis of AF and thyrotoxicosis (p value=0.03). Four of the 5 patients with congestive HF had a normal left ventricular ejection fraction. The conclusion was that HF due to thyrotoxicosis (thyrotoxicosis-induced HF) in young patients is not rare. Furthermore, thyrotoxicosis-induced HF is mostly presented with dilated cardiomyopathy and high output HF.

In another study, clinical aspects and response to treatment in 7 patients with thyrotoxicosis presenting with dilated cardiomyopathy and high output HF were investigated. Three women and 4 men at a mean age of 47 ± 4 years were admitted with a diagnosis of HF. Thyrotoxicosis was the result of Graves' disease in 6 patients, and multi-nodular toxic goiter in the other patient. Upon echocardiography of these patients, there was evidence of left ventricular dysfunction. Treatment for HF and thyrotoxicosis resulted in rapid clinical improvements. During the 5-month to 9-year follow-up of these patients, with return of systolic left ventricular to normal function, dilated cardiomyopathy in 5 patients was completely improved and severe left ventricular dysfunction in 2 of the patients was turned into mild LV dysfunction. It can be inferred that some patients with thyrotoxicosis may have a reversible form of dilated cardiomyopathy and low output HF [5].

The current study showed that, statistically, the duration of heart condition in the patients with thyrotoxicosis did not differ with that of the patients without thyrotoxicosis; this finding chimes in with the results of some previous studies [6-9].

Despite the low frequency of thyrotoxicosis as a cause of HF, timely diagnosis and treatment for this condition can prevent irreversible consequences. We suggest that thyroid profile be a part of routine workup in patients with HF.

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