ORIGINAL ARTICLE

A Cross Sectional Study on the Pervasiveness of Cardiovascular Anomalies in Thyrotoxicosis

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ABSTRACT

Background: This is a cross sectional study carried out in the department of medicine (Cardiology Division), Allied Hospital Faisalabad. In this study, almost 60 cases were analyzed to identify abnormalities associated with cardiovascular system in the thyrotoxicosis.

Objective: The aim of the study was to evaluate the importance as well as prevalence of cardiovascular abnormalities in the patients having thyrotoxicosis.

Settings and Design: This study was executed in tertiary care hospital within a period of approximately one year in which 60 cases were taken. 15 subjects were males while 45 subjects were females. This study includes the subjects of age within 15 – 83 years.

Methods and Material: The study involves cases of newly diagnosed thyrotoxicosis that were analyzed on the basis of information collected on taking history, physical examination and cardiovascular examination as well as investigation, hormonal evaluation, complete profile of biochemistry, radiographs of chest and ECG (12- lead), ECHO (mode/2 dimensional / colored Doppler US).Percentages were calculated according to the qualitative data to make descriptive analysis. In order to evaluate quantitative variables, standard deviation as well as mean were evaluated for calculation and report formation.

Results: About 60 subjects were taken of which 46.1 years was mean age and the range was between 15-83 years and 75% were females. The presentation of fatigue and weakness was 100 percent present in all the patients along with breathlessness, palpitations, weight loss contributing about 92 percent, hypertrophy of ventricles (42 percent), congestive heart failure (40 percent), arrythmias and cardiomegaly contributing about (30 percent) and (25 percent) with bundle branch block.

Conclusion: The prognostic factors and the results of cardiovascular disease is associated with early treatment or management with hormonal control. Therefore, thyrotoxicosis related cardiovascular abnormalities must be evaluated.

Key words: Thyrotoxicosis, hyperthyroidism, cardiovascular abnormalities.

INTRODUCTION

The excessive amount of thyroid hormone is called thyrotoxicosis which effects the metabolism of body intensively including heart[1-2]. Cardiac related disease can occur due to thyrotoxicosis. These types of abnormalities related to cardiovascular system are secondary affects of thyroid hormone action (positive inotropic and chronotropic)on the heart[3-4]. The most common abnormalities associated with cardiovascular system are: valvular heart disease (MR, MVP, TR), arrythmias (AF, paroxysmal atrial tachycardia, atrial premature contraction, AV block, atrial flutter and Ventricular fibrillation), congestive heart failure, angina pectoris, pulmonary hypertension, MI and familial hypertrophic cardiomyopathy[5-6]. The pathophysiology of these complication is unclear as it was reported that left ventricular function was enhanced associated with thyrotoxicosis[7-8]. The main objective of the study was to find out the clinically important abnormalities of cardiovascular system and its prevalence in thyrotoxicosis patients.

MATERIAL AND METHODS

After the consent and approval from ethical committee, this study was done in the department of medicine, in the divisions of cardiology and endocrinology, Allied Hospital Faisalabad for one-year duration from March 2019 to March 2020. The medicine and endocrinology OPD patients and patients from cardiology department were eligible subjects for this cross-sectional study. Newly diagnosis cases of thyrotoxicosis were taken while patients with existing thyrotoxicosis or already having treatment and hyperthyroidism patients were not included in the study. The evaluation criteria of history taking, physical examination and cardiovascular evaluation and investigations like hormonal and biochemical analysis, radiographs of chest, ECG and ECHO (mode/2 dimensional / colored Doppler US) was followed, and descriptive analysis was done in which percentages were calculated to extract qualitative variables while standard deviation and mean value calculation for quantitative analysis.

RESULTS

60 patients were the part of study of which 45 subjects were female and 15 subjects were male. 46.1 years was the mean standard age while the age range was within 15 – 83 years. 48.15 years was mean age for gender male and 43.30 years was for females. The prominent symptoms found in every subject were fatigue and weakness. Other symptoms include palpitations, breathlessness, loss of weight. The other common signs include tremors, cardiac murmurs, sinus tachycardia and thyromegaly.

Table 1 shows the age range of patients

	Male	Female
No. of Patients	15 (25%)	45 (75%)
Age		
<30yrs	3	13
30-60 yrs	9	24
>60 yrs	3	8

About 51.66 percent was presented with normal ECG, 42 percent presented with ventricular hypertrophy, 14 percent were the patient with bundle branch block and 30 percent patients presented with atrial fibrillation. The left atrium was enlarged in approximately 35 percent patients.

Table 2 shows Clinical Indices of individuals with Thyrotoxicosis

No.	Symptoms	Signs
1	Fatigability - 60 (100%)	Sinus Tachycardia 43 (72%)
2	Palpitation- 55 (92%)	Tremors - 43 (72%)
3	Shortness of Breath - 56 (93%)	Thyromegaly - 31 (52%)
4	Weight loss - 55 (92%)	Murmur - 31 (52%)
5	Heat intolerance - 51 (85%)	Basal Crepts - 26 (43%)
6	Tremors - 49 (82%)	Increased JVP - 23 (38%)
7	Increased Sweating - 43 (72%)	Eye - 23 (38%)
8	Polyphagia - 39 (65%)	Pedal oedema - 13 (22%)
9	Thyromegaly - 37 (62%)	Hepatomegaly - 9 (15%)
10	Cough - 33 (55%)	Splenomegaly - 9 (15%)
11	PND - 31 (52%)	Reflexes - 9 (15%)
12	Bowel Symptoms - 27 (45%)	Proximal Weakness- 7 (12%)
13	Polyuria - 22 (37%)	
14	Leg swelling - 20 (33%)	
15	Menstrual Symptoms - 11 (18%)	
16	Abdominal Swelling - 7 (12%)	
17	Eye Symptoms - 4 (7%)	

Table 3 shows the findings of ECG among patients of Thyrotoxicosis

Findings	No. of Patients	% age
ECG Normal	31	52%
Axis Deviation		
Normal	55	92%
Left	3	5%
Right	2	3%
Ventricular Hypertrophy Left	21	35%
Right	4	7%
Bundle Branch Block Left	4	7%
Right	6	10%
A-V Block		0%
1st Degree	2	3%
Arrhythmias		
Atrial Fibrillation	18	30%
ST-T Wave Changes	21	35%

The mean size of left atrium was 4.2cms. The mean dimensions of left ventricle in diastolic phase were 5.1cms and 3.2cms. The ejection fraction was 58.20%. About 9 subjects presented with left ventricular dysfunction but it was not severe. Less number of patients showed up with mild TR and MR in this study.

The most common finding in chest radiographs were cardiomegaly and congestive heart failure in patients having thyrotoxicosis.

Table 4 shows the findings ECHOamong Patients of Thyrotoxicosis

Findings	No. of Patients	%age
ECHO		
Increased LA—size	21	35%
LV Systolic dysfunction	9	15%
LV Diastolic dysfunction	6	10%
MR (Mild)	27	45%
MV Prolapse	9	15%
TR	15	25%

Table 5 shows X-ray Chest findings of Thyrotoxicosis Patients

Findings	No. of Patients	%age
X-RayChest		
Cardiomegaly	15	25%
Pleural effusion	9	15%
Congestive Cardiac Failure	24	40%

DISCUSSION

The hormones secreted from thyroid gland caused intense metabolic effects and can caused drastic effects on cardiovascular system. The heart can be affected either directly by thyroid action or by stimulation of sympathetic nervous system. Hemodynamic changes can also cause secondary affects on cardiovascular system. In this study, female preponderance (75%) was noted as compared to males (225%). According to this study, 72% thyrotoxicosis patient were found to be presented with tachycardia (table 2). While other studies analysis showed 74% and 63.5% patients.The common sign were tremors in this study with 82% incidence. While according to Bhadada et al, 78.2% patients presented with it[9-10]. 55% presented with systolic murmur due to MR or TR as compared to the study of Bhadada et al[11]. The basal crackles and elevated JVP in CHF patients that were approximately 43% and 40% respectively was observed in this study while Singh G et al revealed these abnormalities in almost all the patients.Whereases other studies displayed only 5.4% CHF cases because of timely intervention[12-13].About 7% presented with eye symptoms in this study as compared to the studies of Zargar et al and Bhadada et al. 52% patients revealed normal ECGwhich was similar in the case study of Gordon et al[14].This study showed 5% patients having axial deviation from which 3% were with left axial deviation and 2% were with right axial deviation as compared to the study of Gupta et al[15-16]. Approximately 35% and 7% patients in this study were presented with left ventricular hypertrophy and right ventricular hypertrophy, respectively showing higher incidence of left ventricular hypertrophy in contrast with another studies[17-18].This may be due to late onset cases presented in hospital. In 10% cases, RBBB was present (table 3) on the other hand Gupta S et al, revealed it in about 3.6% patients. In this study, no patient showed complete AV block but within thyrotoxicosis patient which was back to normal after restoring the euthyroid state.The most common arrythmia in thyrotoxicosis patient was atrial

fibrillation with high mortality and morbidity rate due to embolus[19-20]. In this study, 30% patients presented with AF while Zargar et al showed 8%, Jayaprasad N et al revealed 10 to 15% and the study of Auer J et al displayed 13.8% patients[21-22]. About 75% patients had normal size of left atrium according to ECHO reports and other patients revealed enlarged LA with mean size of about 4.2cms which was a little increased as compared to the study of Singh G et al[23]. The left ventricular ejection fraction according to our study was 58.20% while Merce J et al displayed 69 + 9%. No patients in our study showed pericardial effusion and left atrium or ventricular clot while Gupta S et al showed 26% patients having it[24].About 45% had mild mitral regurgitation from which 15% were suffering from Mitral valve prolapse. No patient in this study showed MR. Mild TR was presented in about 25% patients which on the other study of Merce J et al was quite high along with pulmonary hypertension[25].Approximately 25% showed cardiomegaly on chest radiograph and 40% revealed CHF while Zargar AH et al displayed patients of cardiomegaly about 10% and CHF about 7%. According to an old study of Sandler et al, 32% cases showed cardiomegaly as well as CHF that was slightly near to this study.The study of Londhey VA et al showed DCM (dilated cardiomyopathy) which was irreversible in young females because of thyrotoxicosis. According to Dhadke SV, a middle age man presented with the case of DCM due to left ventricular dysfunction with ejection fraction 30% on 2-dimensional echocardiography. But in this study, no patient revealed DCM[24-25]. According to different studies, thyrotoxicosis patients were found to be at greater risk of having coronary artery disease.

CONCLUSION

Concluding the entire study, it was stated that in thyrotoxicosis patient, cardiovascular abnormalities must be checked and proper cardiac examination should be made compulsory. The prognostic factors and the results of cardiovascular disease is associated with early treatment or management with hormonal control. Therefore, thyrotoxicosis related cardiovascular abnormalities must be evaluated to plan proper treatment and improve morbidity.

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