

Analysis of Cardiovascular Manifestations Among Subjects with Hypothyroidism at a Tertiary Care Hospital

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ABSTRACT

Background: Thyroid hormones modulate every component of the cardiovascular system necessary for normal cardiovascular development and function. Hence, the present study was conducted for evaluation of cardiovascular manifestation among subjects with hypothyroidism.

Materials & Methods: 100 patients with presence of hypothyroidism were enrolled in the present study. Complete demographic and clinical details of all the patients was recorded. A Perform was made and complete medical history was recorded separately. ECG and ECHO was done in all the patients and cardiac profile was recorded. All the results were recorded in Microsoft excel sheet.

Results: Mean age of the patients was 49.2 years. Mean ejection fraction was found to be 45.9%. ECG findings were seen in 58 percent of the patients. Among various ECG findings, atrial ectopic and ventricular ectopic were seen in 5 percent and 8 percent of the patients respectively. Sinus bradycardia was seen in 19 percent of the patients while left ventricular hypertrophy was seen in 15 percent of the patients.

Conclusion: Thyroid hormone affects virtually every anatomic and physiologic component of the cardiovascular system. In the presence of heart disease, thyroid dysfunction merits a high level of clinical suspicion.


Key words: Cardiovascular, Hypothyroidism, Hormone.

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INTRODUCTION

Hypothyroidism is the most common disorder arising from hormone deficiency. According to the time of onset it is divided in congenital and acquired, according to the level of endocrine dysfunction in primary and secondary or central and according to the severity in severe or clinical and mild or subclinical hypothyroidism. The distinction between subclinical and clinical hypothyroidism is of major significance as in clinical hypothyroidism symptoms are more severe even coma may occur, while in subclinical hypothyroidism symptoms are less serious and may even be absent.¹⁻³ Overt hypothyroidism is associated with typical symptoms and signs such as the slowing of motor activity, constipation, cold intolerance, menorrhagia, stiff muscles, sleep apnea, dry skin, weight gain, snoring, and a hoarse voice. Less common symptoms involve the heart, muscle, joints, and blood.^{4,5}

Thyroid hormones modulate every component of the cardiovascular system necessary for normal cardiovascular development and function. When cardiovascular disease is present, thyroid function tests are characteristically indicated to determine if overt thyroid disorders or even subclinical dysfunction

exists. As hypothyroidism, hypertension and cardiovascular disease all increase with advancing age monitoring of TSH, the most sensitive test for hypothyroidism, is important in this expanding segment of our population. A better understanding of the impact of thyroid hormonal status on cardiovascular physiology will enable health care providers to make decisions regarding thyroid hormone evaluation and therapy in concert with evaluating and treating hypertension and cardiovascular disease.⁶⁻⁸ Hence; the present study was conducted for evaluation of cardiovascular manifestation among subjects with hypothyroidism.

MATERIALS & METHODS

The present study was conducted for evaluation of cardiovascular manifestation among subjects with hypothyroidism in the Department of Cardiology, Rama Medical College Hospital & Research Centre, Mandhana, Kanpur, Uttar Pradesh, India. A total of 100 patients with presence of hypothyroidism were enrolled in the present study. Complete demographic and clinical details of all the patients was recorded. A Perform was made and complete medical history was recorded separately. ECG and

ECHO was done in all the patients and cardiac profile was recorded. Patients with presence of any other systemic illness (Diabetes, Chronic kidney disease etc) were excluded from the present study. All the results were recorded in Microsoft excel sheet and were subjected to statistical analysis using SPSS software.

RESULTS

The present study was conducted for evaluation of cardiovascular manifestation among 100 subjects with hypothyroidism. Majority proportion of patients were males and belonged to the age group of 40 to 60 years. Mean age of the patients was 49.2 years. Mean ejection fraction was found to be 45.9%. ECG findings were seen in 58 percent of the patients. Among various ECG findings, atrial ectopic and ventricular ectopic were seen in 5 percent and 8 percent of the patients respectively. Sinus bradycardia was seen in 19 percent of the patients while left ventricular hypertrophy was seen in 15 percent of the patients. Left ventricular posterior wall thickness (LVPWT) was 7.96 while ejection fraction was found to be 45.9%.

Table 1: ECG findings

ECG findings	Number	%
Atrial ectopic	5	5
Ventricular ectopic	8	8
ST and T wave alteration	8	8
Sinus bradycardia	19	19
Left ventricular hypertrophy	15	15
ST Segment alteration	11	11
No change	42	42

Table 2: Cardiac variables

Cardiac variables	Mean	SD
LVPW thickness	7.96	1.112
EF	45.9	2.133

DISCUSSION

Hypothyroidism affects between 4% and 10% of the population, and the prevalence of subclinical hypothyroidism is reported to be as high as 10% in various studies. Hypothyroidism is diagnosed when low levels of the thyroid hormones result in elevated levels of thyroid-stimulating hormone (TSH), whereas subclinical hypothyroidism is diagnosed when TSH levels are elevated above the upper limit of the assay reference range with normal thyroid hormone levels. Thyroid hormones play an important role in the normal function of heart and vascular physiology, and hypothyroidism produces profound cardiovascular effects.⁹⁻¹¹ Hence; the present study was conducted for evaluation of cardiovascular manifestation among subjects with hypothyroidism. The present study was conducted for evaluation of cardiovascular manifestation among 100 subjects with hypothyroidism. Majority proportion of patients were males and belonged to the age group of 40 to 60 years. Mean age of the patients was 49.2 years. Mean ejection fraction was found to be 45.9%. ECG findings were seen

in 58 percent of the patients. Among various ECG findings, atrial ectopic and ventricular ectopic were seen in 5 percent and 8 percent of the patients respectively. Prior population-based cohort studies have demonstrated associations between higher FT4 levels in the euthyroid range and incident atrial fibrillation, incident heart failure, and sudden cardiac death. Higher FT4 levels may reflect lower peripheral deiodination of T4 to T3 because of increases in cytokines, free fatty acids, and cortisol, leading to inadequate T3 because of unavailability of T4 precursor.¹²⁻¹⁴ In patients with heart failure, low T3 levels have been associated with myocardial fibrosis and abnormalities in myocardial perfusion and metabolism. The low T3 syndrome, defined as a low T3 level with levels of TSH and FT4 in the reference range, is present in 20% to 30% of patients with heart failure. The prevalence of low T3 syndrome in our study was 14%. In studies of hospitalized patients with heart failure, low T3 syndrome was independently associated with higher all-cause mortality.¹⁵⁻¹⁸

Sinus bradycardia was seen in 19 percent of the patients while left ventricular hypertrophy was seen in 15 percent of the patients. Left ventricular posterior wall thickness was 7.96 while ejection fraction was found to be 45.9%. In another similar study conducted by Al-Farttoosi AJM et al, authors investigated cardiac changes in primary hypothyroidism. The main cardiac manifestations of hypothyroidism were: Easy fatigability, exertional dyspnea, obesity, sinus bradycardia, and peripheral edema. Electrocardiography showed sinus bradycardia in 47 % and low QRS voltage in 33.3% of the patients. Low QRS voltage was found to be related to thyroxine level and age of the patient. No correlation was found between heart rate and thyroxine level.¹⁹ Similar findings were reported in the study conducted by S. Selvamuthukumaran et al who evaluated the cardiovascular manifestations with the thyroid hormone levels of the hypothyroid patients. 50% of the hypothyroid patients had ECG changes. The most common abnormality noted was sinus bradycardia (22%). Other ECG abnormalities observed were atrial ectopics, RBBB, ventricular ectopics. Diastolic dysfunction was seen in 51% of the hypothyroid patients characterized by altered E/A ratio, prolonged DT, and prolonged IVRT.²⁰

CONCLUSION

Thyroid hormone affects virtually every anatomic and physiologic component of the cardiovascular system. In the presence of heart disease, thyroid dysfunction merits a high level of clinical suspicion.

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