



## STUDY OF ELECTROCARDIOGRAPHIC AND ECHOCARDIOGRAPHIC CHANGES IN PATIENTS OF HYPOTHYROIDISM AND EFFECT OF TREATMENT IN TERTIARY CARE HOSPITAL OF ROHILKHAND REGION

### General Medicine

<b>Mittal Archit</b>	Senior Resident, Department of Medicine, SRMS-IMS, Bareilly
<b>Rawal M.P.*</b>	Assistant Professor, Department of Medicine, SRMS-IMS, Bareilly *Corresponding Author
<b>Agarwal Amresh</b>	Professor, Department of Medicine, SRMS-IMS, Bareilly
<b>Johri Sharat</b>	Professor and Head of Department, Department of Medicine, SRMS-IMS, Bareilly

### ABSTRACT

**Aims & Objectives:** To evaluate the cardio-vascular changes by Electrocardiography and Colour Doppler Echocardiography in newly diagnosed patients of hypothyroidism. The effect of treatment on these changes were also documented.

**Methodology :** A Cross-Sectional prospective study consisting of 60 cases of hypothyroidism was undertaken to study the cardiac manifestations by ECG and Colour Doppler Echocardiography.

**Results:** In our study, hypothyroidism was encountered most commonly in females(78.33%) and age group of 24-34years(33.33%). The commonest ECG changes encountered in this study were Low Voltage Complexes in 38.3% followed by T wave changes in 36.6% during the 1st visit. RBBB was seen in 2 patients and persisted on follow up. As per Echocardiographic abnormalities, Diastolic dysfunction was the commonest finding seen in 18.3% patients on 1st visit which persisted in 10% patients on follow up, followed by Pericardial Effusion.

**Discussion:** In the study population, female preponderance was seen. Low Voltage complexes were seen in 38.3% of patients in our study and Sashi et al found it in 40% patients while T wave changes in our study showed 36.6% while Sashi et al found them in 23.3%. On ECHO, Diastolic dysfunction was seen in 18.3% of patients and R.verma found it in 27% patients.

**Conclusion:** Early assessment of cardiac complications through Electrocardiography and Echocardiography is desired to minimize morbidity and mortality in patients of hypothyroidism. The study also confirms that most of these changes are reversible with treatment.

### KEYWORDS

Fine needle aspiration Cytology, FNAC, Cervical lymphadenitis, Histopathology.

#### Introduction

The most common functional disorder of thyroid gland is hypothyroidism. Primary hypothyroidism accounts for over 99% cases. The prevalence of hypothyroidism in developed world is 4-5%. Thyroid hormones have a profound effect on a number of metabolic processes in virtually all tissues and hence virtually every tissues in the body is affected to a greater or lesser extent by thyroid hormone deficiency. A wide range of cardiovascular complications are associated with hypothyroid state ranging from systolic and diastolic dysfunction to accelerated atherosclerosis, isolated diastolic hypertension, coronary artery disease, pericardial diseases and overt cardiac failure.<sup>1</sup>

Common ECG changes seen in a patient of hypothyroidism are Sinus bradycardia, QT prolongation, Low voltage complexes, Decreased amplitude of P wave, incomplete or complete RBBB, Atrial fibrillation and AV blocks. Common Echocardiographic changes seen are Pericardial effusion, increased intraventricular posterior wall thickness and diastolic dysfunction.

This study highlights the cardiovascular complications as visualized in electrocardiogram and color Doppler echocardiography.

The completely reversible nature of these complications after starting treatment is well known hence the study aims at assessing cardiac manifestations at first visit and comparing it with the follow up visit after 6 months of treatment.

#### Aims and Objectives

1. To assess the cardiac changes in confirmed hypothyroid patients by electrocardiogram and a color Doppler echocardiogram
2. To see the effect on these changes after 6 month of treatment in follow up.

#### Materials and methods

Source of Data was all cases of hypothyroidism reporting to SRMS IMS Hospital which include indoor and outdoor patients. Study duration was from October 2014 to October 2015. The study was a Cross-Sectional prospective study consisting of 60 cases of hypothyroidism in whom the cardiac manifestations were documented by ECG and Colour Doppler Echocardiography.

**Inclusion criteria :** Hypothyroid patients which include

- a) All patients of hypothyroidism
- b) Age 14 to 70 years

#### Exclusion Criteria :

- 1) Patients with known congenital cardiac disease, Coronary Artery Disease and Rheumatic Heart Disease
- 2) Patients with Diabetes Mellitus, Chronic Pulmonary Obstructive Disease and Severe anemia
- 3) Patients taking medication that alter thyroid function like beta blockers, lithium, oral contraceptives and steroids
- 4) Secondary hypothyroidism
- 5) Any other Endocrine disorders

All patients were subjected to general and detailed systemic examination and evaluated for age and sex distribution. All patients with TSH more than 4.5 units and low T4 concentration were included in the study and investigated. They underwent CBC, RBS, Urine R/M, Albumin, Blood urea, Serum creatinine, Lipid profile, Thyroid Profile, Thyroid peroxidase, Thyroid Globulin Antibodies and Thyroid Ultrasonography were also done whenever indicated. Normal range for total T4 in healthy, euthyroid adults with a normal circulating TBG is 6 to 11 ug/dl. T3, T4, TSH was estimated using BIOMERIEUX VIDAS instrument.

A standard 12 lead ECG and a Colour Doppler Echocardiography was done using Siemen's ACCUSON Model no. KT-LM170SDS.

Statistical analysis was done using Microsoft Excel 2010 software. Mean  $\pm$  SD was calculated and T-Test applied. P value  $<0.05$  was considered as statistically significant, a value of  $<0.01$  was very significant and  $<0.001$  as highly significant.

#### Result

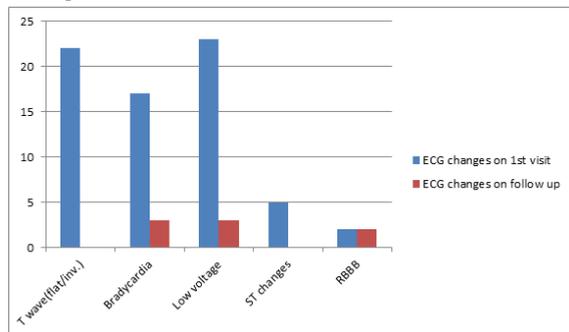
In our study, hypothyroidism was encountered most commonly in females(78.33%) and age group of 24-34years(33.33%).

#### ECG changes

In our Study, the commonest ECG abnormality encountered was Low Voltage complexes seen in 23 patients(38.3%) followed by T wave changes in 22 patients out of 60(36.6%) during the 1<sup>st</sup> visit. Bradycardia was seen in 17 patients(28.3%) at the time of diagnosis. ST changes were seen in 5(8.3%) patients on initial visit.

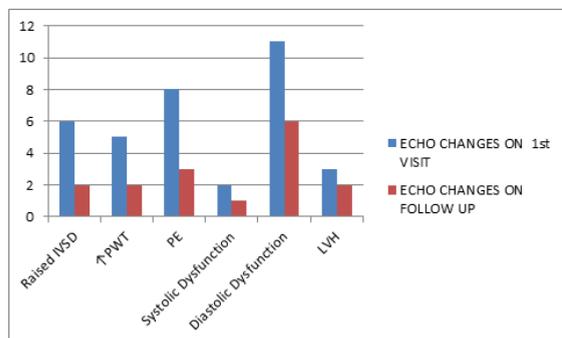
On follow up after 6 months on treatment with Levothyroxine, Low voltage complexes recovered in 20 patients and T wave changes completely disappeared on follow up. Bradycardia remained in 3 (5%) patients and ST segment changes disappeared on follow up.

RBBB was seen in 2 patients on initial visit and did not disappear on follow up.



#### ECHO findings

Echocardiographic abnormalities were seen in 35 out of 60 patients (58.3%)



On initial visit, the commonest finding seen was Diastolic dysfunction seen in 11(18.3%) patients while 'Raised Interventricularseptal dimensions' was seen in 6(10%) patients. Pericardial effusion was seen in 8(13.33%) patients.

On follow up after 6 months on treatment with Levothyroxine, Diastolic dysfunction persisted in 5 patients while Raised IVSD disappeared in 4 patients. Pericardial effusion recovered in 5 patients after treatment.

#### Discussion

In the study population, there was a female preponderance consisting of 78.3% of the study population, which is well in concordance to existing literature.

Low voltage complexes was the commonest ECG abnormality in our study found in 23 patients(38.3%). Shashi et al<sup>2</sup> found Low voltage complexes in 40% of the study population. T wave changes were seen in 36.6% patients in our study while Sashi et al<sup>2</sup> found them in 23.3% of the cases. Bradycardia was found in 28.3% of patients in this study and Suresh Babu et al<sup>3</sup> found it in 4% of cases and Sashi et al<sup>2</sup> found it in 66.6% of the cases. RBBB was seen in 2 patients which persisted on follow up. MH Nikoo<sup>4</sup>, MD also documented sinus tachycardia, QT prolongation and also ventricular tachycardia which was not found in our study. On follow up after treatment for 6 months, Low voltage complexes recovered in 20 patients(87%), T wave changes completely disappeared while RBBB persisted even after treatment.

On Echocardiography, Diastolic dysfunction was seen in 18.3% patients and R.verma<sup>5</sup> showed it in 27% of the patients and Suresh Babu et al<sup>3</sup> showed Diastolic Dysfunction in 19% of the study population. Pericardial effusion, in our study, was seen in 13.3% patients and R.Verma<sup>5</sup> showed Pericardial effusion in 45% of cases. Rawat B and Satyal A<sup>6</sup> reported Pericardial effusion in 30-80% of patients with hypothyroidism. On follow up after treatment for 6 months, Diastolic dysfunction recovered in 54.5% patients while Raised IVSD recovered in 66.6% patients. Pericardial effusion recovered in 62.5% patients after treatment.

#### Summary

This study comprised of 60 patients with a female preponderance for hypothyroidism. It was mostly seen in the 3<sup>rd</sup> and 4<sup>th</sup> decades of life. Low voltage complexes was the commonest finding on ECG seen in 38.3% of all patients in the study population, among other findings were T wave changes(flat/inv.)-36.66% and RBBB in two patients. After 6 months of follow up and Levothyroxine substitution, most patients showed improvement in the form of normal ECG. This depicts that treatment of hypothyroidism leads to an improvement in ECG parameters.

With respect to Echocardiography, the commonest abnormal finding in the sample was Diastolic Dysfunction, seen in 18.3% patients but decreased to 10% of patients after 6 months of Levothyroxine substitution. 13.33% patients had pericardial effusion during the initial visit, after 6 months of treatment only 5% had persistent pericardial effusion. 10% patients had raised IVSD on initial assessment which reduced to 3.33% following 6 months of Levothyroxine treatment. This depicts that treatment with Levothyroxine in hypothyroidism patients leads to an improvement in ECHO parameters.

#### Conclusion

Majority of patients suffering from primary hypothyroidism have demonstrable evidence of cardiac involvement. ECG and Echocardiography are the non invasive tools to detect the earliest changes in these patients. It has been observed in our study that majority of these cardiac changes disappear with prompt and adequate treatment of patients with Levothyroxine. Prevention of Cardiac changes will decrease morbidity and mortality of these patients.

#### REFERENCES

1. The American Journal of Medicine Volume 88, Issue 6, June 1990, Pages 631-637
2. Shashikant M. Study of cardiac dysfunction in hypothyroidism. Indian Journal of Basic and Applied Medical Research; March 2015; Vol. -4, Issue-2, P.111-116.
3. Sureshbabu KP, Gireesh and AmeetkumarOswal. Cardiac manifestations in Hypothyroidism- A cross sectional study. RJPBCS; May- June 2014; 5(3):966-75
4. M.H. Nikoo MD. Department of Internal Medicine, SUMS, cardiovascular manifestations hypothyroidism, SEMJ Vol. 2, No 1, January 2001.
5. R. Verma, Heart in hypothyroidism, JAPI 1996, 44:390-393
6. Rawat B and Satyal A, an echocardiographic study of cardiac changes in hypothyroidism and the response to treatment, Kathmandu University Medical Journal (2003) Vol.2, No.3, Issue 7, 182-187.