

A Study of Cardiac Dysfunction in Patients of Hypothyroidism

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ABSTRACT

Introduction: Thyroid disorders are probably the most common endocrinological disorders affecting the population worldwide. Hypothyroidism is associated with obesity, dyslipidemia and increased atherosclerotic cardiovascular disease. Hypothyroidism are associated with increased cardiovascular morbidity and mortality. The present study was planned to study the cardiac dysfunction in hypothyroidism cases by using non-invasive method ECG and 2 D ECHO.

Material and methods: A total of 100 patients with hypothyroidism were enrolled in the study. They were clinically evaluated and underwent relevant investigations, including thyroid profile, ECG and 2D ECHO for cardiac abnormalities.

Results: Mean age of patients was 40.45 ± 13.03 years. Majority of patients were females (71%). There were only 29% males. Male to female ratio of study population was 0.41:1. Among 100 patients, on ECG abnormal findings were seen in 57% cases. Bradycardia alone was the most common ECG abnormality affecting 27% of patients. 25% patients showed low voltage complexes. A total of 5% patients showed both bradycardia and low voltage complex. On 2D ECHO, 62% patients had normal findings. Abnormal findings were seen in 38%. Among abnormal findings, the most common was mild pericardial effusion (18%) followed by LVDD Grade 1 (16%), LVDD Grade 1 with mild pericardial effusion (2%) and LVDD Grade 2 respectively.

Conclusion: Cardiac dysfunction was found in hypothyroid patients.

Keywords: Hypothyroidism, Cardiac Dysfunction, 2D ECHO.

INTRODUCTIONS

Hypothyroidism is well-recognized to have an association with conditions like obesity, diabetes, hypertension, autoimmune diseases and dyslipidemia.¹ It is associated with increased systemic vascular resistance, decreased cardiac contractility, decreased cardiac output, and accelerated atherosclerosis and coronary artery disease.² The cardiac symptoms among hypothyroidism patients are reflected in terms of bradycardia, mild hypertension (diastolic), narrowed pulse pressure, cold intolerance, and fatigue.³ No doubt the cardiac problems in hypothyroid patients need an early detection and timely intervention to prevent any unfavourable consequences. Fortunately, evaluation of these changes could simply be done by using non-invasive methods like electrocardiograph (ECG) and echocardiography (2D-Echo). Hence, the present study was planned to study the cardiac dysfunction in hypothyroidism cases.

Study aimed to find out prevalence and associated cardiac abnormalities in hypothyroidism patients with their demographic, hematological and biochemical profile.

MATERIAL AND METHODS

This cross sectional study was conducted in SRN Hospital, MLN Medical College Prayagraj from April 2018 to August 2019 with patients more than 18 years of age either sex of hypothyroidism.

100 patients of hypothyroidism diagnosed by suggestive symptoms and confirmed by physical examination and laboratory investigations (serum TSH), were selected randomly admitted and enrolled from the General medicine IPD/OPD of SRN Hospital, Prayagraj were included in the study.

They underwent following Investigations: Complete Throid profile, CBC, S.BILIRUBIN (TOTAL), SGOT, SGPT, ALP, Serum urea, Serum creatinine, fasting lipid profile, ECG, 2D Echocardiography. Patients with known cardiac disease, COPD, severe anemia, diabetes mellitus or any other endocrinological disorders, taking medication that alter the thyroid function like beta blockers, lithium, OCPs, steroid and alcohol were excluded from study.

STATISTICAL ANALYSIS

The statistical analysis was done using SPSS (statistical package for social science) version 21.0 statistical analysis software. The values were represented in number (%) and mean \pm SD. To test the significance of two means the student 't' test was used. The ANOVA test was used to compare the within group and between group variances amongst the study groups. P value <0.05 is taken as significant.

RESULTS

Table no 1-shows Age of patients ranged from 18 to 66 years. Maximum number of patients (26%) were aged 21-30 years followed by those aged 41-50 years (23%), 31-40 years (22%), 51-60 years (20%), 61-70 years (6%) and <20 years (3%) respectively. Mean age of patients was 40.45 ± 13.03 years.

Majority of patients were females (71%). There were only 29% males. Male to female ratio of study population was 0.41:1. Serum T3 level ranged from 0.03 to 3.60 mU/ml with

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| SN | Characteristic | Statistic |
|-----|-------------------------------------|--------------------------|
| 1. | Age (in years) | |
| | <20 Years | 3 |
| | 21-30 Years | 26 |
| | 31-40 Years | 22 |
| | 41-50 Years | 23 |
| | 51-60 Years | 20 |
| | 61-70 Years | 6 |
| | Mean Age±SD (Range) | 40.45±13.03 (18-66) |
| 2. | Gender | |
| | Male | 29 |
| | Female | 71 |
| 3. | Mean T3±SD (Range) mU/ml | 1.48±0.87 (0.03-3.60) |
| 4. | Mean T4±SD (Range) µg/dl | 0.99±0.53 (0.01-1.96) |
| 5. | Mean TSH±SD (Range) mU/ml | 30.00±22.89 (11.52-100) |
| 6. | Mean pulse rate±SD (range) bpm | 68.80±16.05 (40-100) |
| 7. | Mean Hb±SD (range) g/dl | 11.86±0.59 (11.0-13.3) |
| 8. | Mean TLC±SD (range) thousands/cumm | 7.01±1.74 (4-10.4) |
| 9. | Mean S. bilirubin±SD (range) mg/dl | 0.50±0.16 (0.26-0.96) |
| 10. | Mean SGOT±SD (range) U/L | 26.36±7.14 (13.34-38.44) |
| 11. | Mean SGPT±SD (range) U/L | 26.18±7.16 (10.78-38.92) |
| 12. | Mean S. urea±SD (range) mg/dl | 28.12±5.38 (18.56-40.05) |
| 13. | Mean S. creatinine±SD (range) mg/dl | 1.06±0.19 (0.68-1.38) |

Table-1: General Profile and Clinical Characteristics of Study Population (n=100)

| SN | Finding | Number & % |
|----|-----------------------------------|------------|
| 1. | Normal | 43 |
| 2. | Abnormal | 57 |
| | Bradycardia | 27 |
| | Low voltage complex | 25 |
| | Bradycardia + Low voltage complex | 5 |

Table-2: Distribution of cases according to ECG Evaluation Findings

| SN | Finding | Number & % |
|----|--|------------|
| 1. | Normal | 62 |
| 2. | Abnormal | 38 |
| | Mild pericardial effusion | 18 |
| | LVDD Grade 1 | 16 |
| | LVDD Grade 1 + Mild pericardial effusion | 2 |
| | LVDD Grade 2 | 2 |

Table-3: Distribution of cases according to 2D ECHO Findings

mean of 1.48 ± 0.87 mU/ml. Serum T4 level 0.01 to $1.96\mu\text{g}/\text{dl}$ with mean of $0.99\pm0.53\mu\text{g}/\text{dl}$. Serum TSH level ranged from 11.52 to 100 Mu/ml with a mean of $30.00\pm22.89\text{mU}/\text{ml}$. Mean pulse rate of study population as $68.80\pm16.05\text{bpm}$. Table no 2-shows ECG abnormal findings were seen in 57% cases. Bradycardia alone was the most common ECG abnormality affecting 27% of patients. There were 25% patients showing low voltage complex. A total of 5% patients showed both bradycardia and low voltage complex.

Table no 3-shows On 2D ECHO, a total of 62% patients had normal findings. Abnormal findings were seen in 38%. Among abnormal findings, the most common was mild pericardial effusion (18%) followed by LVDD Grade 1 (16%), LVDD Grade 1 with mild pericardial effusion (2%)

and LVDD Grade 2 respectively.

DISCUSSION

The present study included 100 hypothyroid patients and it was conducted in MLN Medical College, data analysis was done and discussed and compared with previous trials.

The mean age of the study population was 40.45 ± 13.03 years. Most patients belonged to the age groups of 31-40 years, thus showing hypothyroidism is more common among middle age group. Similar findings were shown in a study done by Shashikant M4 who found prevalence of hypothyroidism among middle age group. The female population constituted about 71% of the total cases recruited and percentage of male patients was 29% with female : male ratio 2.5:1. This female preponderance of hypothyroidism was consistent with demographic profiles mentioned in most of the medicine textbooks including Harrison principles of Internal Medicine.⁵

A study done by Gopalakrishnan et al⁶ regarding epidemiology of hypothyroidism had similar results (females vs males: 15.86% vs 5.02%). In our study among hypothyroid patients ECG was normal in 43% of patients and was abnormal in 57% of patients. Similar study was conducted by Suresh babu et al⁷ over 100 hypothyroid patients and was found that ECG abnormality occurred in 31% of the patients. Among ECG abnormalities, bradycardia was found in 27% of patients followed by low voltage complexes in 25% of the patients with Both bradycardia and low voltage complex next to occur in order i.e. 5% patients.

In our study bradycardia was most consistent ECG abnormality documented. Ramesh and Nayak⁸ also observed predominance of bradycardia amongst ECG abnormalities in a study conducted over 40 hypothyroid patients with

bradycardia in 16 out of 40 patients followed by low complex in 14, ST-T changes in 10 patients LBBB in 2 patients and RBBB IN 3 patients.

A similar study regarding ECG abnormality among hypothyroid patients was done by Satpathy et al⁹ and it was observed that 24 out of 72 hypothyroid patients (54.5%) had ECG abnormalities, among which ST depression was seen in 15 patients, sinus bradycardia in 12 patients, T wave inversion-low voltage complex in 8 patients. A study done by Goyal and Goyal¹⁰ had consistent results with our study showing ECG abnormalities among a significant number of patients with bradycardia documented in 26.9%, ST-T changes and low voltage complexes in 15.3% and prolonged QTc interval in 3.8%.

Patients with long standing hypothyroidism may suffer serious cardiac complications if not evaluated early and properly. 2D echocardiography is the best non-invasive screening tool to evaluate such patients and avoid serious complications. In the present study, echocardiography findings were found to be normal in 62% of patients with 38% of patients documented to have echo abnormalities. Pericardial effusion was the most common finding amongst all other ECG abnormalities including systolic and diastolic dysfunction and was seen in 18% of cases(having mild effusion).

Rawat B and Satyal A¹¹ reported pericardial effusion in upto 30-80% of patients with hypothyroidism. This finding implies that patients with undiagnosed pericardial effusion must undergo evaluation for hypothyroidism. In our study diastolic dysfunction seen in 18% of patients, with majority of them having mild dysfunction (16% LVDD grade 1) and rest 2% having LVDD grade 2.2% of the patients had both LVDD grade 1 and mild pericardial effusion. These findings were consistent with study done by R.Varma¹² in 1995 who demonstrated diastolic dysfunction in 27% of patients. Similar previous studies were conducted by various authors regarding cardiac abnormalities in hypothyroid patients and results were strikingly similar. Study done by Karki et al¹³ showed that 15 out 40 patients of subclinical hypothyroidism had diastolic dysfunction(37.5%).K. Ramesh and BalajiPrasad Nayak⁸found same abnormalities in hypothyroid patients on echocardiography.(Out of 40 patients of hypothyroidism, 27.5% had pericardial effusion, 27.5% had diastolic dysfunction.

CONCLUSION

Hypothyroid is more common among middle aged female population. Cardiac dysfunction are prevalent among hypothyroid patients. Sinus bradycardia was the most common ECG abnormality observed. Most common 2D-Echo abnormality observed was LVDD grade 1. All hypothyroid patients must undergo cardiac evalution by ECG and 2D-Echo.

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