

## Prevalence of left ventricular diastolic dysfunction in patients with subclinical hypothyroidism

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### Abstract

**Background and Aim:** Subclinical hypothyroidism (SCH) is diagnosed when peripheral thyroid hormone levels are within normal reference laboratory range but serum thyroid-stimulating hormone (TSH) levels are mildly elevated. Thyroid hormone regulates different cellular and molecular mechanisms by which it exerts action on almost every cell and organ in the body including heart. We tried to ascertain prevalence of LV diastolic dysfunction in patients of subclinical hypothyroidism. **Methods:** Hospital based study was done in patients of SCH fitting in inclusion and exclusion criteria attending the OPD/IPD of Mahatma Gandhi Hospital, Jaipur. **Results:** Mean TSH levels in Subclinical Hypothyroidism cases is  $7.41 \pm 1.57$  mU/L, mean Free T4 levels is  $1.57 \pm 0.38$  pmol/L and Mean Free T3 levels is  $4 \pm 0.71$  pmol/L. Mean LVEDD is  $47.56 \pm 3.24$  mm, mean LVESD is  $30.518 \pm 5.7$  mm, Diastolic IVST is  $9.8 \pm 1.49$  mm, Diastolic LVPWT is  $9.8 \pm 1.7$  mm and LVM is  $35.81 \pm 5.7$  mm.

**Conclusion:** Cardiovascular changes are commonly associated with newly detected Subclinical hypothyroidism. Early diagnosis and correction of hypothyroidism is necessary; so that early effects on cardiovascular system can be minimized.

**Keywords:** Subclinical Hypothyroidism, Left Ventricle, Diastolic dysfunction, Incidence

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### Introduction

Subclinical Hypothyroidism (SCH) is a common condition. SCH, also called mild thyroid failure, is diagnosed when peripheral thyroid hormone levels are within normal reference laboratory range but serum thyroid-stimulating hormone (TSH) levels are mildly elevated [1]. On the basis of the understanding of the cellular mechanisms of thyroid hormone action on the heart and cardiovascular system, it is possible to explain the changes in cardiac output, cardiac contractility, blood pressure, vascular resistance, and rhythm disturbances that result from thyroid dysfunction [2]. It has long been recognized that most common signs and symptoms of thyroid disease are due to the effects of thyroid hormone on the heart and cardiovascular system [3,4]. We tried to ascertain prevalence of LV diastolic dysfunction in patients of subclinical hypothyroidism. Abnormal LV diastolic filling (suggestive of impaired LV relaxation) hypothyroidism is the most prevalent thyroid disorder affecting 3–

is a common finding in patients with Subclinical Hypothyroidism and that this abnormality may be reversed by a short term substitutive Levothyroxin therapy [5,6].

**Method:** This study is conducted in all the female cases attending the OPD and IPD of Department of General Medicine, Mahatma Gandhi Medical College, Jaipur.

**Inclusion criteria:** All females in the age group between 20 to 50 years who are found to have subclinical hypothyroidism will undergo 2D Echo. The patient selected for 2D Echo will be those having Serum FT3: 2.77-5.27 pg/ml, serum FT4: 0.78-2.19 ng/dl and serum TSH: 5-10 micro unit / L.

**Exclusion criteria:** • Patients who fail to give the consent. • Age less than 20 years • Age more than 50 years • HR >100Beats/Minute

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Results

Table 1: Distribution of Cases according to Clinical Symptoms

| Clinical Symptoms | No. of Cases | Percent |
|-------------------|--------------|---------|
| General weakness  | 19           | 21.1    |
| Facial puffiness  | 7            | 7.8     |
| Swelling of limbs | 6            | 6.7     |

|                             |    |      |
|-----------------------------|----|------|
| Hoarseness of voice         | 12 | 13.3 |
| Cold intolerance            | 7  | 7.8  |
| Weight gain                 | 11 | 12.2 |
| Skin changes                | 6  | 6.7  |
| Pain in muscle & joints     | 17 | 18.9 |
| Constipation                | 14 | 15.6 |
| Slow in physical activities | 12 | 13.3 |

**Table 2: Distribution of Cases according to CVS Symptoms**

| CVS symptoms       | No. of Cases | Percent |
|--------------------|--------------|---------|
| Chest Pain         | 5            | 5.6     |
| Breathlessness     | 9            | 10.0    |
| Effort intolerance | 8            | 8.9     |
| Palpitations       | 9            | 10.0    |

**Table 3: Echocardiographic parameters to left ventricular morphology in subclinical hypothyroid patients**

|                 | N  | Minimum | Maximum | Mean   | Std.Deviation |
|-----------------|----|---------|---------|--------|---------------|
| LVEDD           | 90 | 40.5    | 58.6    | 47.562 | 3.2480        |
| LVESD           | 90 | 3.1     | 39.4    | 30.518 | 5.7042        |
| Diastolic IVST  | 90 | 6.2     | 14.5    | 9.876  | 1.4991        |
| Diastolic LVPWT | 90 | 5.8     | 13.7    | 8.984  | 1.2749        |
| LVM             | 90 | 8.4     | 44.7    | 35.818 | 5.7042        |

**Table 4: Doppler echocardiographic parameters of left ventricular function in subclinical hypothyroid patients (Diastolic function)**

| Diastolic Function |    |         |         |        |               |
|--------------------|----|---------|---------|--------|---------------|
|                    | N  | Minimum | Maximum | Mean   | Std.Deviation |
| E(cm/sec)          | 90 | 63.0    | 89.2    | 76.390 | 5.0230        |
| A(cm/sec)          | 90 | 43.0    | 69.2    | 56.390 | 5.0230        |
| E/A Ratio          | 90 | 1.3     | 1.5     | 1.358  | 0.0348        |
| IRT(msec)          | 90 | 81.3    | 117.5   | 95.424 | 6.4961        |

19 (21.1%) cases complained of general weakness, followed by pain in muscles and joint in 17(18.9%), then 12 (13.3%) cases complained of hoarseness of voice, weight gain in 11 (12.2%), facial puffiness in 7 (7.8%) and 6 (6.7%) cases complained of swelling of limbs and skin changes. Some showed CVS symptoms like 9 (10%) cases complained of breathlessness and palpitations, whereas 8 (8.9%) cases complained of effort intolerance and 5 (5.6%) cases complained of Chest pain. In Subclinical Hypothyroidism cases mean TSH levels is 7.41±1.57 mU/L, mean Free T4 levels is 1.57±0.38 pmol/L and mean Free T3 levels is 4±0.71pmol/L. In our study among 90 subclinical thyroid cases the mean LVEDD

is 47.56±3.24mm, LVESD is 30.518±5.7mm, Diastolic IVST is 9.8±1.49mm, Diastolic LVPWT is 9.8±1.7mm and LVM is 35.81±5.7mm. In our study mean E is 76.39±5.02 cm/sec, mean A is 56.39±5.02 cm/sec, mean E/A ratio is 1.358±0.035 and mean IRT is 95.42±6.49msec. Out of 90 Subclinical Hypothyroidism cases 7.7% of cases had Ventricular dysfunction, among them 4.4% are suffering from Systolic Ventricular dysfunction and 3.3% of cases are suffering from Diastolic Dysfunction.

**Conclusion**

Cardiovascular changes are commonly associated with newly detected Subclinical hypothyroidism.

**Table 5: Ventricular dysfunction in the study population**

| Age group   | Systolic     |            | Diastolic    |            |
|-------------|--------------|------------|--------------|------------|
|             | No. of cases | Percentage | No. of cases | Percentage |
| 21-30 years | 0            | 0%         | 0            | 0%         |
| 31-40 years | 2            | 2.2%       | 1            | 1.10%      |
| 41-50 years | 2            | 2.2%       | 2            | 2.20%      |
| Total       | 4            | 4.4%       | 3            | 3.30%      |

**Discussion**

SCH is a major health problem worldwide. After this study we came to know that patients of SCH have LVDD and other clinical symptoms. Doppler echocardiography represents a simple and reliable method for the evaluation of morphology and function in patients with SCH, so it may be considered a reliable method for a cross sectional and longitudinal assessment of left ventricular diastolic function in patients of SCH. The identification of hypothyroid patients is an important individual and public health issue. Early diagnosis and correction of hypothyroidism is necessary; so that early effects on cardiovascular system can be minimized.

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