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ORIGINAL RESEARCH

Assessing The Prevalence Of Left Ventricular Diastolic Dysfunction In Patients With Subclinical Hypothyroidism

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ABSTRACT:
Background: Subclinical hypothyroidism (SCH) is typically identified when peripheral thyroid hormone levels fall within the standard laboratory reference range, yet there is a slight elevation in serum thyroid-stimulating hormone (TSH) levels. Thyroid hormone plays a critical role in regulating various cellular and molecular processes, affecting nearly every cell and organ in the body, including the heart. We conducted a study to determine the frequency of left ventricular diastolic dysfunction in individuals with subclinical hypothyroidism.
Methods: A hospital-based study was conducted on individuals with subclinical hypothyroidism (SCH), adhering to specific inclusion and exclusion criteria
Results: The average TSH(Thyroid-stimulating hormone) levels in cases of Subclinical Hypothyroidism are 7.31±1.57 mU/L, the mean Free T4 levels are 1.47±0.38 pmol/L, and the mean Free T3 levels are 4±0.61 pmol/L. Additionally, the mean LVEDD(left ventricle end diastolic dimension measures 46.56±3.24 mm, the mean LVESD is 30.418±5.7 mm, the Diastolic IVST is 9.6±1.49 mm, the Diastolic LVPWT is 9.6±1.7 mm, and the LVM is 34.81 ±5.7 mm.
Conclusion: Cardiovascular alterations are frequently linked with the identification of newly detected subclinical hypothyroidism. It is imperative to diagnose and address hypothyroidism promptly to mitigate its early impact onthe cardiovascular system.
Keywords: Subclinical Hypothyroidism, Left Ventricle, Diastolic dysfunction, Incidence

INTRODUCTION:

Subclinical Hypothyroidism (SCH) is a prevalent condition, also known as mild thyroid failure, which is identified when peripheral thyroid hormone levels fall within the normal range established by laboratory references, but serum thyroid-stimulating hormone (TSH) levels are only slightly elevated[1]. By comprehending the cellular mechanisms through which thyroid hormones influence the heart and the cardiovascular system, it becomes feasible to elucidate the alterations in cardiac output, cardiac contractility, blood pressure, vascular resistance, and rhythm irregularities that stem from thyroid dysfunction[2].For quite some time, it has been acknowledged that the primary manifestations and indications of thyroid disorders primarily result from the influence of thyroid hormones on the heart and the cardiovascular system[3,4]. Our study aimed to determine the occurrence of left ventricular diastolic dysfunction in individuals with subclinical hypothyroidism. We observed that abnormal left ventricular diastolic filling, indicating impaired left ventricular relaxation, is a frequently encountered issue in patients with subclinical hypothyroidism. Furthermore, we found that this irregularity can potentially be corrected through short-term replacement therapy with Levothyroxine. Subclinical hypothyroidism (SCH) is a thyroid disorder characterized by elevated serum thyroid-stimulating hormone (TSH) levels and normal serum free thyroxine (FT4) levels. It affects a range of 4% to 20% of adults and has the potential to progress to overt hypothyroidism in roughly 2% to 5% of cases each year.1,2 The prevalence of SCH tends to increase with age and is more commonly observed in females.[5,6]Overt hypothyroidism is known to bring about various cardiac abnormalities, such as pericardial effusion and heart failure.3 It is associated with an increase in peripheral resistance and a decrease in left ventricular (LV) diastolic function[7]. Notably, there have been no previous studies conducted on the south Indian population regarding this matter. The presence of left ventricular diastolic dysfunction (LVDD) is linked to higher rates of morbidity and mortality, underscoring the significance of early

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intervention when LVDD is observed in individuals with SCH. This study was carried out to evaluate LV diastolic function in patients with subclinical hypothyroidism.

MATERIALS AND METHODS: This study is conducted exclusively in female cases.
Inclusion Criteria:

- All females within the age range of 20 to 50 years who have been diagnosed with subclinical hypothyroidism will undergo a 2D Echo examination.
- The selected patients for the 2D Echo test should meet the following thyroid hormone level criteria: Serum FT3 levels between 2.77-5.27 pg/ml, serum FT4 levels between 0.78-2.19 ng/dl, and serum TSH levels between 5-10 micro units/L.

Exclusion Criteria:

- Patients who do not provide their consent.
- Individuals below 20 years of age.
- Individuals above 50 years of age.
- Patients with a heart rate exceeding 100 beats per minute.

RESULTS:

Table 1: Distribution of Cases according to Clinical Symptoms

Clinical Symptoms	No. of Cases	Percent
General weakness	36	21.1
Facial puffiness	14	7.8
Swelling of limbs	12	6.7
Hoarseness of voice	24	13.3
Cold intolerance	14	7.8
Weight gain	22	12.2
Skin changes	12	6.7
Pain in muscle & joints	34	18.9
Constipation	28	15.6
Slow in physical activities	24	13.3

Table 2: Distribution of Cases according to CVS Symptoms

CVS symptoms	No. of Cases	Percent
Chest Pain	10	5.6
Breathlessness	16	10.0
Effort intolerance	16	8.9
Palpitations	18	10.0

In our study, we observed that among the individuals with subclinical hypothyroidism, 18.9% reported muscle and joint-related complaints, followed by 13.3% of cases experiencing hoarseness of voice, 12.2% with weight gain, 7.8% with facial puffiness, and 6.7% with swelling of limbs and skin changes. Some individuals also displayed cardiovascular symptoms, with 10% reporting breathlessness and palpitations, while 8.9% had effort intolerance, and 5.6% complained of chest pain.Regarding thyroid hormone levels in subclinical hypothyroidism cases, the mean TSH levels were 7.31±1.57 mU/L, the mean Free T4 levels were 1.47±0.38 pmol/L, and the mean Free T3 levels were 4±0.61 pmol/L[8].In our study involving 180 cases of subclinical hypothyroidism, we found that the mean left ventricular end-diastolic dimension (LVEDD) was 46.56±3.24 mm, the left ventricular end-systolic dimension (LVESD) was 30.418±5.7 mm, diastolic interventricular septal thickness (Diastolic IVST) was 9.6±1.49 mm, diastolic left ventricular posterior wall thickness (Diastolic LVPWT) was 9.6±1.7 mm, and left ventricular mass (LVM) was 34.81±5.7 mm. Additionally, the mean E (early diastolic filling velocity) was 76.39±5.02 cm/sec, the mean A (late diastolic filling velocity) was 56.39±5.02 cm/sec, the mean E/A ratio (E/A) was 1.358±0.035, and the mean isovolumetric relaxation time (IRT) was 95.42±6.49 msec. Out of the 180 cases of subclinical hypothyroidism, 7.7% exhibited ventricular dysfunction, with 4.4% suffering from systolic ventricular dysfunction and 3.3% experiencing diastolic dysfunction.

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DISCUSSION:

Subclinical hypothyroidism (SCH) is a significant global health concern. Through this study, we have gained a better understanding of the link between SCH and left ventricular diastolic dysfunction (LVDD) as well as other clinical symptoms. Doppler echocardiography has proven to be a straightforward and dependable technique for evaluating both the structure and function in individuals with SCH. Therefore, it can be considered a reliable approach for both one-time assessments and continuous monitoring of left ventricular diastolic function in SCH patients[9].Identifying individuals with hypothyroidism is not only crucial for individual health but also holds substantial public health importance. Early detection and the subsequent correction of hypothyroidism are imperative, as they play a pivotal role in minimizing the early adverse effects on the cardiovascular system.

These findings align with results from other studies that have demonstrated a clear connection between subclinical hypothyroidism (SCH) and the occurrence of left ventricular diastolic dysfunction (LVDD). Notably, our study revealed a statistically significant presence of LVDD in individuals with TSH levels exceeding 10 mU/L ($p = 0.03$). To ensure the reliability of our findings, we rigorously adhered to strict exclusion criteria when selecting patients for this study.[10] We excluded individuals with potential factors that could contribute to LVDD, such as those with diabetes, systemic hypertension, preexisting thyroid disorders under treatment, ischemic heart disease (IHD), and those taking medications that could affect thyroid hormone balance. Therefore, we can confidently attribute the LVDD observed in these cases to subclinical hypothyroidism, particularly in cases with elevated TSH levels.

CONCLUSION:

It's frequently observed that cardiovascular changes are commonly linked to the detection of newly identified cases of subclinical hypothyroidism. Cardiovascular alterations are frequently connected with the recent identification of subclinical hypothyroidism. It is crucial to promptly diagnose and treat hypothyroidism to minimize its initial impact on the cardiovascular system.

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