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Original Research Article

Symptom Profile Including Cardiovascular Manifestations among Newly Diagnosed Adult Hypothyroid Patients in a Tertiary Care Hospital

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Abstract:

Hypothyroidism is a common endocrine disorder characterized by a deficiency in thyroid hormone production or action. It affects millions of people worldwide, with a higher prevalence among women and older individuals. The research used a prospective cross-sectional study design to investigate the symptom profile, including cardiovascular manifestations, among newly diagnosed adult hypothyroid patients. To conclude, cardiovascular manifestations are an important aspect of the symptom profile among adult hypothyroid patients. The interplay between thyroid hormone deficiency and various cardiovascular pathophysiological changes can result in bradycardia, impaired myocardial contractility, dyslipidemia, and pericardial effusion.

Introduction

Hypothyroidism is a common endocrine disorder characterized by a deficiency in thyroid hormone production or action. It affects millions of people worldwide, with a higher prevalence among women and older individuals [1]. Hypothyroidism affects 2% of adult women and 0.1-0.2% of adult men [2].

While the classic symptoms of hypothyroidism are well-documented (fatigue, weight gain, cold intolerance, etc.), [2] the full spectrum of its clinical presentation, particularly in newly diagnosed adults, remains an area of ongoing investigation. This is especially true for cardiovascular manifestations. One of the most common cardiovascular symptoms observed in hypothyroid patients is bradycardia, which refers to a slow heart rate [3]. Bradycardia occurs due to decreased sympathetic drive and impaired cardiac conduction. It can be accompanied by other arrhythmias such as sinus arrest, sinus bradycardia, and premature atrial or ventricular contractions [3].

Hypothyroidism also affects cardiac contractility, resulting in decreased stroke volume and cardiac output. This reduction in cardiac function can lead to exercise intolerance, exertional dyspnea, and fluid retention, resulting in peripheral edema and pleural effusion [4].

Furthermore, alterations in lipid metabolism, specifically an increase in low-density lipoprotein (LDL) cholesterol and total cholesterol, and a decrease in high-density lipoprotein (HDL) cholesterol, are commonly observed in hypothyroid patients. These lipid abnormalities contribute to an increased risk of atherosclerosis and coronary artery disease [5]. In addition to dyslipidemia, hypothyroidism has been associated with increased systemic vascular resistance and impaired endothelial function. These vascular changes further potentiate the risk of hypertension and promote the progression of atherosclerosis. Moreover, hypothyroidism can lead to pericardial effusion, which may result in cardiac tamponade [6]. Understanding the full spectrum of its clinical presentation, particularly in newly diagnosed hypothyroid patients can be very crucial for the following reasons:

Early Detection

A more comprehensive understanding of the presenting features, especially those related to the cardiovascular system, can facilitate earlier diagnosis and treatment initiation. This is important as untreated hypothyroidism can lead to significant health complications, including cardiovascular disease, the leading cause of death globally [7].

Improved Prognosis

Early intervention with thyroid hormone replacement therapy has been shown to improve various aspects of cardiovascular health in patients with hypothyroidism [8].

Characterizing the cardiovascular symptoms in newly diagnosed cases can optimize treatment strategies and potentially improve long-term outcomes.

Risk Stratification

Identifying patients with prominent cardiovascular symptoms within the newly diagnosed hypothyroid population might allow for targeted risk stratification. This could lead to more aggressive management approaches for those at higher risk of developing cardiovascular complications. This study investigates the symptom profile, with a particular focus on cardiovascular manifestations, among newly diagnosed adult patients with hypothyroidism. By analyzing the prevalence and characteristics of these symptoms, this study contributes to develop a more comprehensive understanding of the disease presentation. This knowledge can ultimately inform clinical practice and potentially improve patient care.

Aim & Objectives

1. To study the symptom profile including cardiovascular manifestations among newly diagnosed adult hypothyroid patients in a tertiary care hospital.
2. To identify the cardiovascular manifestations among the same group of patients.

Methodology

The research used a prospective cross-sectional study design to investigate the symptom profile, including cardiovascular manifestations, among newly diagnosed adult hypothyroid patients.

A convenient sampling strategy was used to enroll fifty-four (54) newly diagnosed hypothyroid patients from the out-patient department (OPD) of a tertiary care hospital situated in district Faridabad, Haryana, India. The study population comprised adults (age 18 years and above) newly diagnosed with hypothyroidism based on established clinical criteria (e.g., elevated TSH and low free T4 levels) not yet on treatment. Diagnosed patients on L- thyroxin but for less than four months duration. The recruitment took place at OPD of Department of Internal Medicine, ESIC Medical College and Hospital, Faridabad following confirmation of the diagnosis.

The study subjects willing to complete study questionnaire and give written informed consent were enrolled in the research study. The exclusion criteria was individuals having pre-existing overt or subclinical hypothyroidism, known severe medical conditions unrelated to hypothyroidism that could confound the interpretation of symptoms (e.g., advanced heart failure, chronic obstructive pulmonary disease, severe anaemia, diabetes mellitus or any other endocrine disorder). Patients taking medications that alter the thyroid function like beta blockers, lithium, oral contraceptive pills, steroids and alcohol.

Individuals currently pregnant or breastfeeding were also excluded. Written informed consent was obtained from all participants prior to data collection. Participant confidentiality was maintained throughout the study.

Strengths and Limitations of the study: The study allowed for the identification of the prevalence and distribution of symptoms among newly diagnosed hypothyroid patients. The research relies on self-reported data, which may be subject to recall bias.

Data Collection

A standardized pre-tested questionnaire was administered to collect data on demographics, medical history, current medications, and a comprehensive symptom inventory.

The symptom inventory specifically assessed the presence, frequency, and severity of various symptoms, including those related to the cardiovascular system (e.g., chest pain, shortness of breath, palpitations, leg swelling). Additional clinical data (e.g., thyroid hormone levels, blood pressure) was also obtained from laboratory reports of the patient.

All study participants were subjected to following investigations- fT3, fT4, Hemoglobin (Hb), Total Leucocyte Count (TLC), Differential Leucocyte Count (DLC), Erythrocyte Sedimentation Rate (ESR), 12-lead Electrocardiogram (ECG), Echocardiography (ECHO).

Operational Definitions

Subclinical hypothyroidism (SCH) is a condition characterized by an elevated thyroid-stimulating hormone (TSH) level in the blood along with normal levels of free thyroxine (T4) [9]. Essentially, subclinical hypothyroidism represents a stage where the thyroid function is starting to decline, but not yet causing symptoms or hormonal imbalances.

Overt hypothyroidism is a condition characterized by both elevated levels of thyroid-stimulating hormone (TSH) and low levels of free thyroxine (T4) in the bloodstream [10].

Newly diagnosed hypothyroid patients- Patients diagnosed to have hypothyroidism on the basis of biochemical investigations i.e., TSH, T4 within last

four months duration and may or may not be on oral medications for treatment of the same.

Data Analysis

Descriptive statistics was used to characterize the study population and the prevalence of various symptoms, including cardiovascular manifestations. Univariate and multivariate analyses were performed to identify potential associations between hypothyroidism and specific symptoms, particularly cardiovascular manifestations.

Results

Table 1 depicts the distribution of hypothyroid patients according to age and gender, majority of cases i.e., n=23 (42.7%) were in the age group of 41-60 years. The mean age of study participants was 54.2 +/- 14.2 years. Male to female ratio was noted to be 1: 2.7 in our study. The female subjects largely constituted the study population n=39 (72.2%) of the total participants (Table 1).

Table 2 shows distribution of hypothyroid Patients according to age and thyroid state. Easy fatigability was the most common symptom which was present in forty-five (83%) cases of hypothyroidism followed by weight gain in forty one (76%) cases, decreased appetite in thirty six (67%) cases, thirty two (59%) cases had constipation and cold intolerance each. Other symptoms were skin changes, hair loss, excessive sleep, cramps/aches, depression, voice change and neck swelling. Significant cardiac related symptoms such as breathlessness was present in 61% cases and palpitation in 35% study subjects (Table 2).

Table 3 depicts the distribution of hypothyroid patients according to general physical and systemic examination. Skin changes was the most frequent symptom present in 52% participants followed by pallor and edema. On systemic examination twenty-nine (53.7%) patients of Hypothyroidism had delayed ankle jerk. There were nineteen (35.2%) patient who had muffled heart sound. There was significant association between muffled heart sounds and gender of the study subject (p-value-0.0276) (Table 3).

In table 4 showing gender wise distribution of Systolic Blood Pressure (SBP) and Diastolic Blood Pressure (DBP) of study participants. Diastolic hypertension with BP 90 mmHg was found in 62% of patients and raised SBP was noted in approx. 48% subjects.

In table 5 depicting ECG (Electrocardiographic) changes in hypothyroidism, sinus bradycardia was recorded in 46.3% patients, which was the most common ECG finding, which was followed by 44.4% with low voltage complexes, 33.3% patients had ST-T changes, eight (14.8%) patients had Long QT interval (Table 5). Also, among the 2D-Echo changes, diastolic dysfunction was predominant finding in the patients of Hypothyroidism which was present in 59.3% subjects. Other 2D-Echo findings were pericardial effusion, which was present in 44.4% patients, Left ventricular Hypokinesia and left ventricular hypertrophy (LVH) was seen in 2% cases. There was significant association between pericardial effusion and gender of the study subject (p-value-0.025) (Table 5).

In the present study, as shown in table 6 there was significant difference among the groups for serum total cholesterol, but a rising trend was found from patients having TSH less than 10 (mean= 172.82) to the patient having TSH greater than 100 (mean = 286.15). For HDL cholesterol levels, significant differences were observed among the groups with maximum in Patients with TSH less than 10 (mean=44.82) and minimum in patients with TSH greater than 100 (mean = 33.85). Mean LDL cholesterol levels showed significant difference among the patients divided on the bases of TSH concentration with maximum in patients with TSH greater than 100 (mean = 187.69) and minimum in patients with TSH less than 10 (mean = 89.35). Mean serum triglyceride levels were higher in the group of patients with TSH in the range of 50-100 (mean = 291.64) (Table 7). The other routine investigations conducted had no statistically significant results in relation to hypothyroidism.

Discussion

Hypothyroidism is a common endocrine disorder. As per literature, the prevalence of primary hypothyroidism is 1:100 and if the sub-clinical hypothyroidism is included the prevalence rises to 5:100 patients [11]. A similar study conducted by Arindam Bose et al (2015) in the Malwa region observed that subclinical hypothyroidism was present in 6.31% patients and overt hypothyroidism was present in 7.45% patients from the total of 28,677 patients studied [12].

In the present study, maximum twenty-three (43%) patients of all the patients diagnosed with hypothyroidism fall in the age group of fourth and fifth decade. The mean age of the patients was 54.2 +/- 14.2 years with female ratio being 1: 2.7, which was in agreement to the study conducted by Arindam bose et al [12] in Malwa region; which reported that hypothyroidism was most common among thyroid disorders and female to male ratio was approximately 3:1 and the age group of 19-45 years had the higher incidence of hypothyroidism. These observations are also similar to other studies Unnikrishnan AG et al. (2013) [13], Jatwa J and Ismail B (2012) [14]. The most common symptoms

included weight gain, lethargy, dry skin, hoarseness of voice and constipation. The diagnosis of hypothyroidism may be overlooked for several years because of the insidious and non-specific nature of symptoms that further complicates the detection of hypothyroidism [15]. In our study on general examination most common findings were weight gain, dry skin etc.

Delayed relaxation of ankle jerk is the most common finding on examination present which correlates well with the description in textbooks [2].

On ECG sinus bradycardia was the main finding found followed by low voltage complex and ST-T wave changes. Dyslipidemia has been reported as a common metabolic abnormality in patients with thyroid disease, either in the overt or subclinical forms of the disease and constitutes the end result of the effect of thyroid hormones in all aspects of lipid metabolism leading to various quantitative and/or qualitative changes of triglycerides, phospholipids, cholesterol, and other lipoproteins [16]. In our study there is increase of total cholesterol, LDL, VLDL, triglycerides and decrease of HDL. This is also in agreement with other studies [16].

On 2D-Echo the finding of diastolic dysfunction (59.3%) followed by pericardial effusion (44.4%) was found in a significant group of people which correlates with the study conducted by Kabadi et al [17] and Shasikanth M et al [18].

Conclusion

To conclude, cardiovascular manifestations are an important aspect of the symptom profile among adult hypothyroid patients. The interplay between thyroid hormone deficiency and various cardiovascular pathophysiological changes can result in bradycardia, impaired myocardial contractility, dyslipidemia, and pericardial effusion.

Early recognition and appropriate management of hypothyroidism are essential to prevent or manage these cardiovascular manifestations effectively. Any unexplained pericardial effusion should be screened for hypothyroidism. It should be always advised to screen hypothyroid patients for cardiac abnormalities.

Since, there is a clear association between hypothyroidism and high levels of serum total and low-density lipoprotein cholesterol, so testing for lipid profile in patient with hypothyroidism should be a regular practice. Hence, physicians should maintain a high index of suspicion for hypothyroidism in patients presenting with unexplained cardiovascular symptoms, ensuring timely diagnosis and appropriate intervention.

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