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Original research article

Dyslipidemia in newly diagnosed primary hypothyroidism

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Abstract

Background: Hypothyroidism is a medical condition caused by a low level of thyroid hormones. Thyroid hormone plays an important role in lipid metabolism. Hence it is important to evaluate lipid profile in patients with primary hypothyroidism to evaluate the extent of derangement and intervene at the earliest.

Material and Methods: Research conducted in Department of General Medicine, Government Medical College, Ongole, Andhra Pradesh, India. Patients at Government General Hospital, Ongole who met the research's inclusion and exclusion criteria were the subjects of this prospective study.

Results: One hundred patients with a recent diagnosis of primary hypothyroidism met the inclusion and exclusion criteria and participated in this prospective trial. They had a clinical examination and any necessary tests performed as detailed in the enclosed proforma. Patients were almost exclusively female (80%), with only 20% male.

Conclusion: Patients who were recently diagnosed with Primary Hypothyroidism and were not receiving medication had higher lipid values. Patients were almost exclusively female (80%), with only 20% male. Patients with hypothyroidism tended to be younger, in their twenties and thirties.

Keywords: Dyslipidemia, laboratoryprofile, primary hypothyroidism

Introduction

Hypothyroidism is a medical disorder caused by low levels of thyroid hormones. Hypothyroidism is an extremely common metabolic disorder. Hypothyroidism, the most common form of thyroid disease, affects 42 million people in India. Thyroid hormones have several metabolic functions, including the regulation of lipid, carbohydrate, protein, electrolyte, and mineral production [1, 2].

As hypothyroidism becomes severe, it causes an increase in total cholesterol (TC), Low Density Lipoprotein cholesterol (LDL), and triglyceride levels in the blood [3]. Triglyceride levels, likewise, fluctuate between extremes. Thyroid hormones play a variety of roles in regulating lipid metabolism. Hyperlipidemia, a risk factor for atherosclerotic disease, is virtually certainly caused by a deficiency in thyroid hormones. In this study, we look at how thyroid hormones affect total cholesterol, bad LDL cholesterol (LDL-C), good HDL cholesterol (HDL-C), and triglyceride levels [4, 5].

The thyroid gland, one of the major endocrine glands, is situated on both sides of the neck, immediately below the larynx and in front of the trachea. Average mature weight is between 15 and 20 grams. It takes the form of a butterfly with its two wings joined by an isthmus. In diseases associated with a general increase in gland size, the right lobe tends to enlarge more than the left because of its greater vascularity and larger size. Two sets of arteries provide the main supply of blood to the thyroid gland: the superior thyroid artery, which branches off of the external carotid artery, and the inferior thyroid artery, which branches off of the subclavian artery. Blood is sent to the thyroid gland by both of these arteries. The thyroid receives between 4 and 6 ml/min/g of blood [6, 7].

The thyroid gland plays a pivotal role in the growth and maintenance of the body's metabolism. Thyroid hormones, especially triiodothyronine (T3) and thyroxine (T4), play a key role in this process (also known as tetra iodothyronine in some contexts). Hormones like these are involved in the aforementioned activities (T4). In order to produce T3 and T4, iodine and tyrosine are used as precursors [8].

Calcitonin, a hormone crucial to calcium homeostasis, is produced by the thyroid as well. Thyrotropin-releasing hormone (TRH) is produced in the brain and controls the production of thyroid-stimulating hormone (TSH) by the anterior pituitary. TSH regulates the production of thyroid hormones. Hypothyroidism most often manifests itself in a general slowing down of physical and mental activities [9]. The symptoms and indications may be difficult to detect unless one actively looks for them. The complexity of these changes has led to their being dismissed as a "normal part of aging" on occasion.

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Many different body systems are usually affected in patients. Those who have been told they have primary hypothyroidism should get their lipid profiles checked as soon as possible [10]. This study's goal was to look at the lipid profiles of people who had recently been diagnosed with Primary Hypothyroidism and who also met the study's inclusion and exclusion criteria.

Methodology

Clinical research conducted in Department of General Medicine, Government Medical College, Ongole, Andhra Pradesh. Patients at Government General Hospital, Ongole who met the study's inclusion and exclusion criteria were subjected to a prospective analysis.

Inclusion criteria

- Those with Primary Hypothyroidism Who Have Just Been Diagnosed but Who Are Not Yet Taking Therapy.
- Persons aged 20-80

Exclusion criteria

- Patients with chronic renal disease taking lipid-lowering medications.
- Those with diabetes, genetic dyslipidemia.
- Pregnancy-related hypothyroidism.
- Use of alcohol above limit.

Statistical Methods and Study Design

Data-accurate charts and graphs. Through the application of the linear regression model, we see that hypothyroidism and dyslipidemia are linearly related to one another. After explaining the processes involved in the prospective cohort study of primary hypothyroidism and providing participants with the opportunity to ask questions, researchers included individuals who met the inclusion criteria and for whose consent was obtained. The symptoms and medical results recorded during the preliminary evaluation were consistent with the proforma. They were analyzed using the provided criteria.

Results

One hundred individuals who had just recently been diagnosed with primary hypothyroidism were eligible for participation in this prospective trial after meeting the inclusion and exclusion criteria. They were given a clinical examination as well as any tests that were deemed necessary, all in accordance with the proforma that was provided. Nearly all of the patients were female, accounting for 80% of the total, while only 20% were male.

Table 1: Distribution of cases by gender

Sr. No.	Gender	Patients	%
1.	Male	20	20%
2.	Female	80	80%
	Total	100	100%

Table 2: Cases are distributed by age group

Sr. No.	Age	Male	Female
1.	20 to 29	0	38
2.	30 to 39	16	22
3.	40 to 49	4	10
4.	50 to 59	0	8
5.	60 to 69	0	02

Patients had a strong correlation to lipid profile and TSH level. HDL cholesterol had a strong inverse correlation with TSH, but total cholesterol, LDL cholesterol, and triglyceride cholesterol all had substantial positive correlations with TSH. The linearity of the link with serum lipids was present across the entirety of the permitted range of TSH readings.

Table 3: Results for the average values of the study's lipid parameters

Sr. No.	Lipidparameters	Standard Range
1.	Totalcholesterol	150-200
2.	Triglycerides	40-150
3.	LDL	60-130
4.	HDL	45-65

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Individuals who were diagnosed with primary hypothyroidism had overall mean cholesterol values that were significantly higher than the control group. It was also discovered that the subjects in this study had triglyceride levels that were, on average, fairly high. According to the findings of our investigation, the typical LDL level is alarmingly high.

Discussion

The condition of hypothyroidism was identified in females more frequently than in males. The total cholesterol, triglycerides, high-density lipoprotein (HDL), and low-density lipoprotein (LDL) are all components of the lipid profile, whereas the thyroid profile analyzes T3, T4, and TSH levels. This information was used in research that was carried out. When the data had been imported into a spreadsheet created in Microsoft Excel, the statistical tool known as SPSS, version 11.0.0, was used to analyze the data. A linear regression model was created so that we could investigate the degree of connection that exists between the components of the lipid profile and the TSH concentration. HDL cholesterol had a strong inverse correlation with TSH, but total cholesterol, LDL cholesterol, and triglyceride cholesterol all had substantial positive correlations with TSH. There was a linear association with serum lipids across the entire reference range of TSH, which supports the role of thyroid hormones in the regulation of lipid metabolism, a dysregulation of which dysregulates the lipid parameters. Additionally, there was a linear relation between lipid concentration and TSH levels across the entire range of TSH [10, 11].

In a study that was conducted on the Hispanic population, it was discovered that TSH had a linear relationship with total cholesterol, LDL-C, triglycerides, and waist circumference; however, it did not have a linear relationship with HDL-C [12].In a recent population-based research of adults in India, the prevalence of hypothyroidism was found to be 3.9%, and the prevalence of subclinical hypothyroidism was found to be 9.4%. Throughout the course of our investigation, we came to the conclusion that primary hypothyroidism has a significant relationship with dyslipidemia. This research lends credence to the findings of Shantha *et al*., who discovered a connection between dyslipidemia and primary hypothyroidism among city inhabitants. The findings of this study support those findings [13-15].

Bandyopadhyay SK *et al*. conducted research on dyslipidemia in patients with subclinical hypothyroidism. Patients with stable subclinical hypothyroidism were compared to a matched euthyroid group in terms of age and sex. Subgroup analysis was then performed based on these variables as well as the presence or absence of antithyroperoxidase and thyroid stimulating hormone levels. Results showed that patients with stable subclinical hypothyroidism had a higher risk of developing overt hypothyroidism than euthyroid patients with the same age and gender [16]. The majority of the participants in this study were female, and the majority of them presented with non-specific symptoms. This study recruited a total of one hundred patients who had SH. Their ages ranged from 17 to 68 years old. Just ten percent of people who have subclinical hypothyroidism have ever had a goiter, and only 52 percent of them have tested positive for anti-TPO antibodies. Beyond the age of 20, serum levels of lipoprotein (a), total cholesterol, triglycerides, and low density lipoprotein cholesterol were significantly elevated compared to younger ages [17-19]. Although total cholesterol and triglyceride levels were higher in anti TPO positive instances, serum triglyceride and low density lipoprotein cholesterol levels were shown to be higher in anti TPO negative individuals. The levels of total cholesterol, triglyceride, low density lipoprotein cholesterol, and lipoprotein were all significantly higher in females compared to males.

Conclusion

All of the people who had just received the diagnosis of primary hypothyroidism but were not currently taking any medication exhibited elevated levels of lipid markers. Females made up eighty percent of the patient population, with men accounting for the remaining twenty percent. The age range of 20 to 29 years old accounted for 38% of all patients diagnosed with hypothyroidism.

Conflict of Interest

None

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